AIR CONDITIONING HEATING AND VENTILATING

MAY, 1955—52nd YEAR

Weather Forecast for May—page 186

Photo—Piping for Labs—page 95

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For easier and better pipe hanging!

This adjustable swivel hanger attached to a concrete insert is easy to install and will safely carry a wide range of loads. Like all Grinnell Hangers, it permits easy adjustment at any time after pipe is installed . . . to prevent sagging pipe and water traps, and to assure positive drainage. This is just *one* of the ways Grinnell Engineered Pipe Hangers save you maintenance expense, give you a better installation.

A good piping job is too important to jeopardize with improvised or inadequate pipe hangers and supports. There's a Grinnell Hanger for every piping requirement. All Grinnell Hangers comply with piping code specifications.

CB-UNIVERSAL CONCRETE INSERT (Fig. 282) . . . Used for pipe lines up to 12 inches where sizes of hanger rods cannot be readily determined in advance of ceiling construction. This insert is cast in one body size only. V-type teeth grip a special removable nut which is ordered separately and can be furnished tapped for ⅜", ½", ⅝", ¾" or ⅞" hanger rods. Face of insert can be concealed by ceiling finish.

ADJUSTABLE SWIVEL PIPE RING (Fig. 101) . . . Solid ring of malleable iron. Twelve sizes provide load range of 80 lbs. for ¾" size, to 1510 lbs. for 8" size.

LOCKING SWIVEL SHANK of Fig. 101 Pipe Ring . . . To obtain proper adjustment, swivel shank can be turned easily by hand when the weight of the pipe is temporarily taken off the ring. When weight is returned, swivel shank locks automatically, preventing change of adjustment due to vibration. Wire retaining ring keeps swivel shank and pipe ring or yoke from separating, makes assembly a single unit.

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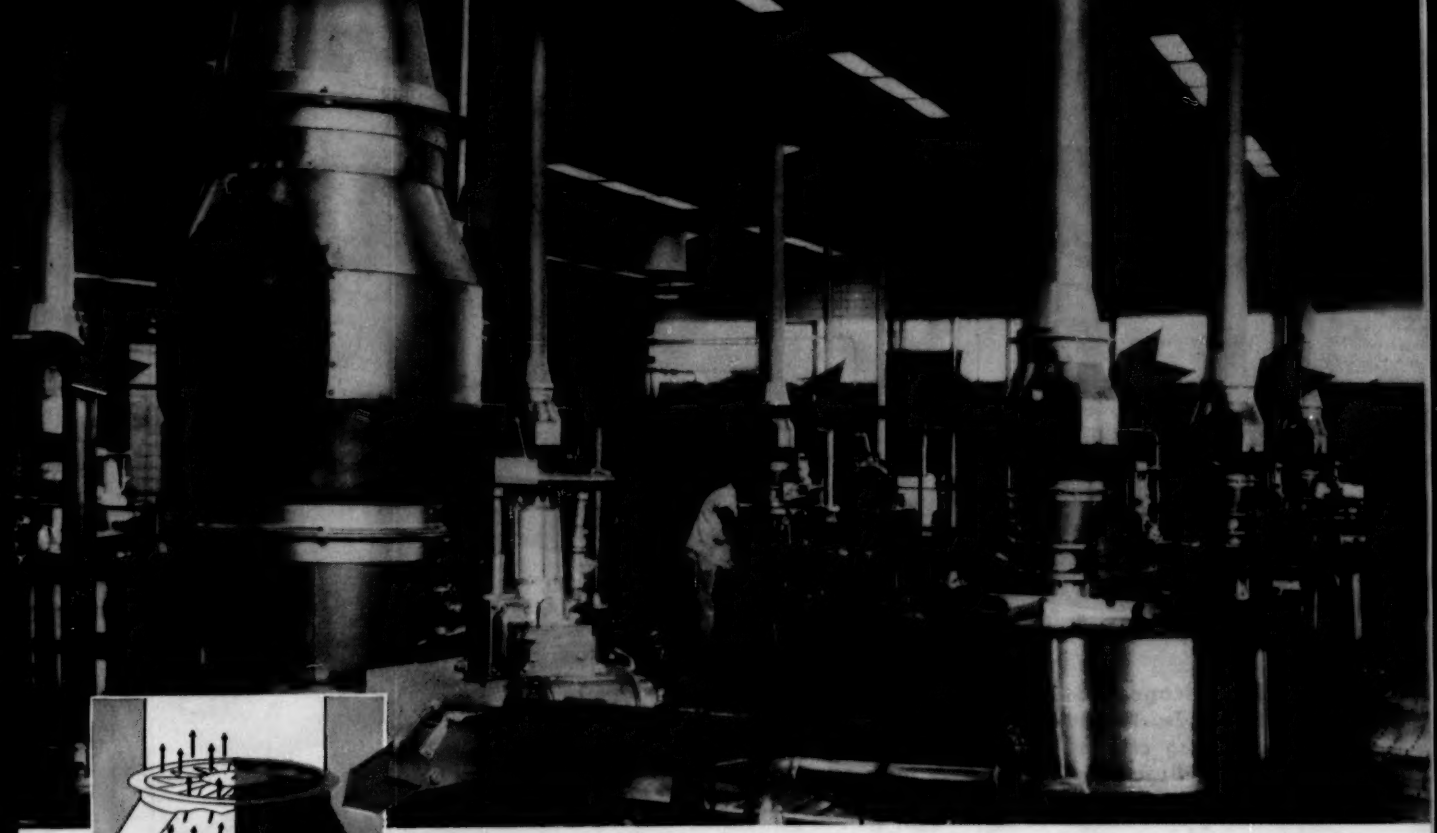
Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems



This fan exhausts corrosive fumes without 90° bend loss

You can have a more efficient fume-removal system with DeBothezat Bifurcator® Fans. These fan units exhaust hot, corrosive and explosive fumes the *direct* way, with no directional change in the air stream to cause pressure losses.

The Bifurcator is a direct-driven fan in a divided housing. Fumes bypass the motor which always stays clean, cool and accessible. A Bifurcator Fan is easily installed . . . just like a flanged section of ductwork. It can be mounted vertically, horizontally or at any angle. Lightweight and compact, a Bifurcator requires no platforms or supports.

Bifurcators are available in sizes from 1140 CFM (12" diameter fan with 1/20 HP motor) up to 45,000 CFM (48" diameter fan with 20 HP motor). Housings and fan wheels can be constructed of cold rolled steel, stainless steel, steel rubber covered, monel metal, and many other corrosion-resistant materials. They can also be coated with Heresite, Ucilon, Tamanite, Herecrol R-9 sprayed synthetic rubber and other coatings.

Be ready with all the Bifurcator facts next time you have a fume-removal problem. Send the coupon for free bulletin. Also get "Design Data for Exhaust Systems," a helpful booklet with simplified data and charts.

De Bothezat FANS

A DIVISION OF

American Machine and Metals, Inc.

EAST MOLINE, ILLINOIS

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Division of American Machine and Metals, Inc.
East Moline, Illinois

Please send me Bifurcator Bulletin DB-4-53 and "Design Data for Exhaust Systems."

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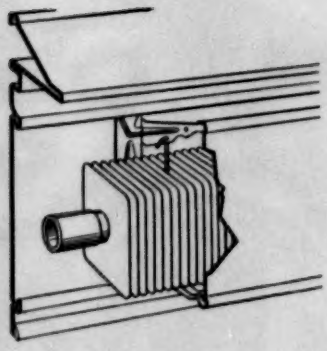
NAME AND TITLE

"Everybody's a Prospect for WEBSTER TRU-PERIMETER HEATING" says Elmer C. Lind



Sectional view of Webster Baseboard Heating element and enclosure.

With Chicago Heating Contractor Elmer C. Lind, it's Webster Tru-Perimeter Forced Hot Water Heating for winter-long comfort at low fuel cost . . . with either Webster Baseboard Heating or Webster Walvector®.

Lind has used this modern system for wall-to-wall heating in homes, apartments, motels, country clubs, trucking terminals, stores, medical centers, and many other types of buildings. He has installed Webster Baseboard to modernize the heating in about 50 homes.

"Webster Tru-Perimeter Heating has sales appeal both for the builder and for the ultimate owner," says Mr. Lind. "It's easy to install and the owner is always pleased with the job. And we like the service we get from the manufacturer and the Webster Representative.

"Savings in fuel cost, reduced maintenance and increased comfort give me a competitive advantage," he added, "and the eye-appeal in both Webster Baseboard and Webster Walvector usually clinches the deal."

Ask your Webster Representative for more information about Tru-Perimeter Forced Hot Water Heating with Webster Baseboard, Webster Standard Walvector® and Webster Custom Walvector®; or write us.

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WARREN WEBSTER & COMPANY

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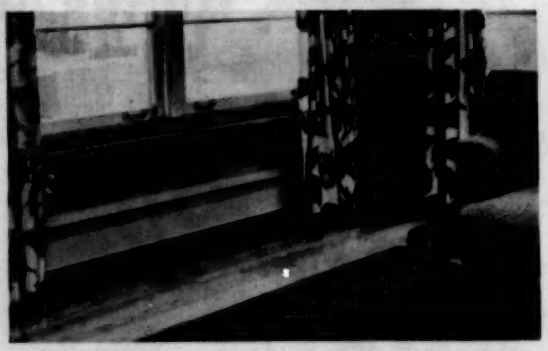
Webster

TRU-PERIMETER FORCED HOT WATER HEATING

SEE **"Design for Comfort", the 40-minute 16-mm. sound motion picture about Webster Baseboard Heating. Available without charge through Webster Representatives. Now booking for showings after May 1st.**

Webster Walvector gives clean, comfortable warmth in washroom of Southmoor Country Club, Orland Park, Ill. Owner: Ben Stevenson. Architect: J. Kocher, Flossmoor, Ill. Heating Contractor: Elmer C. Lind.



Webster Baseboard heats 18 apartments in the Carl B. Anderson Building, Chicago. Architects: Ben and George W. Larson, Chicago. Owner and General Contractor: Carl B. Anderson. Heating Contractor: Elmer C. Lind.

Webster Walvector heats offices of Shippers Dispatch, Inc., Forest View, Ill. Architect: T. C. Buss & Associates, Chicago. Builder: Arthur E. Nelson, Chicago. Heating Contractor: Elmer C. Lind.

AIR CONDITIONING HEATING AND VENTILATING

MAY, 1955

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The Cover: Chemist William Eubanks at laboratories of the Shell Oil Co. sets up glass apparatus for lube oil extraction experiment. Photo courtesy of Shell Oil Co.

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10 good reasons why ULTRALITE* is your best buy in Duct Insulation . . .

1955 marks the *10th year* of duct insulation service for Ultralite, the long glass fiber insulation. More important, Ultralite that was put on ducts a decade ago shows no visible or measurable signs of deterioration today.

No other flexible glass fiber insulation can begin to match this performance record. So when you want insulation performance you can count on—and delivery you can count on—specify Ultralite, the only insulation of long textile-type glass fibers.

Distributors who carry local stocks of Ultralite are listed in the Yellow Pages in 57 cities. Call your nearby distributor, or write today for 8-page brochure.

ULTRALITE DUCT INSULATION (Thermal)

It's "duct soup" to wrap air ducts with Ultralite Thermal Duct Insulation—it's as easy as wrapping a package! Ultralite Duct Insulation is available plain or with your choice of different vapor barrier facings, factory-applied to the insulation. Ultralite is non-irritating, pleasant to handle, fire-resistant and non-corrosive to metals. K-factor is very low—and so are applied costs!

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Ultralite Duct Liner is a flexible, semi-rigid glass fiber insulation designed specifically as an acoustical duct liner, with excellent sound-absorbing properties. It won't break, chip or delaminate—won't flake off in air stream! You can run it quickly around curves and corners, run it through the brakes and shears with the metal, fasten it in place with screws and washers or adhesives.

*Reg. U. S. Pat. Off.

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Thermal and acoustical glass fiber insulations • Pipe coverings and fittings • Railroad gaskets and supplies

HIGH SPOTS

A last-minute attempt to keep the Engineering Societies headquarters in New York is being made by a 5-man committee appointed by that city's commissioner of the Department of Commerce. **Pittsburgh,** now holding space for the headquarters in its Gateway Center, has upped its offer to $2 million.

Merger between National Radiator and U. S. Radiator was formally consummated April 1. New corporate name is National-U. S. Radiator Corporation. Another corporate change in the industry is the acquisition of the **Timken Silent Automatic** Division of Rockwell by **The Scaife Co.,** Pittsburgh pressure vessel manufacturer.

Strike at Kohler Co., Sheboygan, entered second year April 5, with little prospect of early settlement.

Wave of **laboratory building** continues unabated. **Service piping** for multistory labs is thoroughly treated in this month's Reference Section by J. W. York of Stone & Webster, a specialist on this subject.

A **solar boiler** would drive a 10-man space ship and would develop 8000 kw, according to a German rocket specialist speaking before the Institute of Radio Engineers in March. The reflectors for catching the sun's rays would measure 150 feet across.

Central heating will be required in all New York City flats by Nov. 1, 1956, if a measure before the Council is adopted. The objective is to **halt the fires which caused loss of life** this past winter, and to stop the growth of slums.

Ordinary granite rock has a fuel value about **eight times that of coal**—based on the fact that it contains about 30 parts per million of **uranium and thorium** of which about 10% might be recovered as nuclear fuel, according to W. Kenneth Davis, director of the division of reactor development, U. S. Atomic Energy Commission, at the American Power Conference. Mr. Davis hastened to add that for a very considerable time we should have much better nuclear fuel sources than granite.

It's possible to hold **relative humidity constant without refrigeration** if you can let the temperature vary considerably. The system described in this month's lead article is operating successfully in a storage depot in North Africa.

By 1963, **residential air conditioning** will represent 9% of the total kilowatthour annual load as compared with the present 0.8%, C. M. Wallace of Georgia Power told an ARI conference in March.

Cleaning **hot exhaust gases** may require accurate knowledge of moisture conditions. A **psychrometric chart** published in this issue covers the range of 100 to 1500 deg F D.B. and dewpoints to 175 deg.

Known **reserves of natural gas and oil** increased in 1954 in spite of record consumption (see News department).

Bruce A. Jacobi, new president of Baker, Smith & Co. (see Briefly Stated), advises: "As a result of ordinances for **water conservation equipment** to be used with air conditioning systems in many large cities, there are high local concentrations of such water-saving units. As a result, the **design wet bulb has increased** considerably in congested areas."

WASHINGTON OVERTONES

by LORING OVERMAN

Washington observers expect to hear at least three tones when things happen in the Nation's Capital. First comes the action, or its lack; next the whys; then the echo—the evaluation.

Keynote heard in Washington currently is that **only** the most **urgent legislation** has a chance of being completed at this session of Congress. Reason: everything of major importance is wound 'round with controversy of either political or international scope.

Examples? Here:

Tariffs. What have these to do with air conditioning?

• Principally this: **Proposed legislation** having a direct bearing on **domestic industries** is being forced to **wait in line** while Congress considers world problems.

• Mid-April Senate sessions shelved 'most everything else to give top priority to debating extension of Trade Agreements Act. **Administration seeks three-year extension** from June 12. Passed by House but tagged with 100 amendments in Senate.

• Question: What tariff concessions can best serve world economy without rocking domestic boat. Now is time to give Senators instructions . . . backed by facts, figures, case examples.

Formosa . . . distant traffic whistle for U. S. legislation, industry, and military planning. What's happening there (and what is?) results in several overtones:

• In calling for extension of Defense Production Act for one year beyond June 30, Administration appears to be abandoning a previous position. Administration has said it neither needs nor wants standby authority to impose economic controls on prices, wages, rents. Office of Defense Mobilization is now urging such standbys ODM says it is now thinking of **possible shooting war "somewhere,"** rather than atomic attack here. Says standbys might come in handy if shooting started while Congress is in recess.

• Overtone extraordinary is the creation of sort of a military Buck Rogers department within the Air Research and Development command. Heading it . . . an Air Force Lieutenant Colonel assigned the title, Assistant for Innovations.

• Business personnel and labor relations would be affected for years to come by a new military reserve reorganization plan. The bill (H.R. 5297) would require **compulsory service in reserve forces** following active duty.

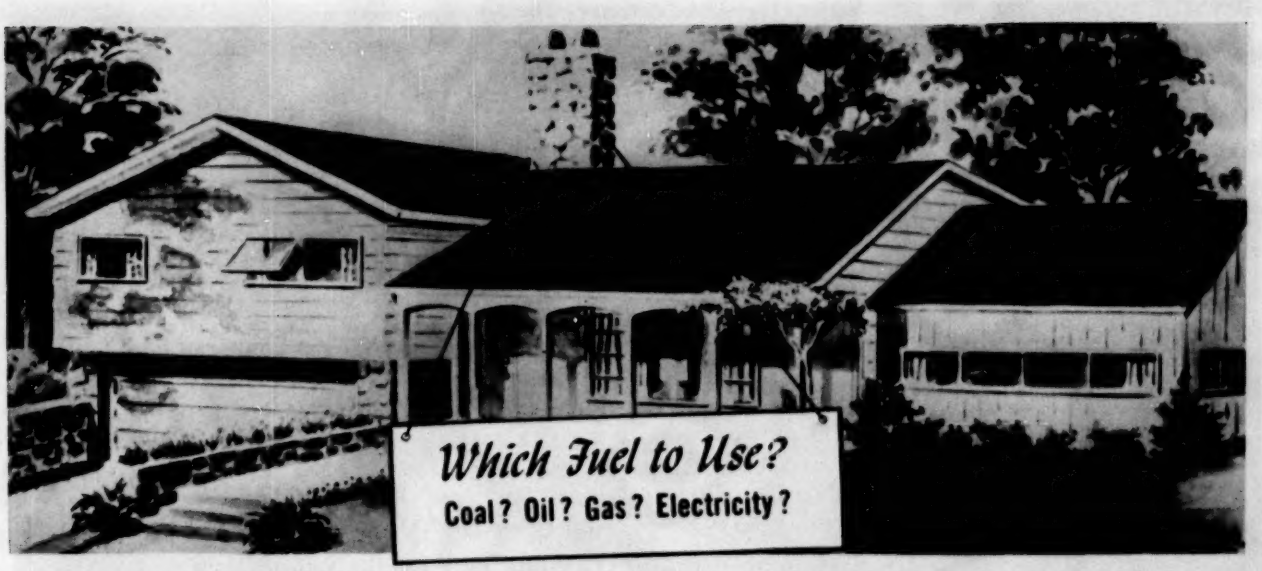
Labor Legislation sounds typically political overtones. Causes promising to appeal to many voters never lack for sponsors. For instances:

• Some 50 bills propose to amend the Fair Labor Standards Act of 1938 (Wage-Hour Law). Most suggest raising minimum wage (now 75¢). Administration suggests 90¢; most labor organizations favor $1.25; one bill proposes $1.35. Senate may compromise at $1.00.

• Other bills would **extend Wage-Hour coverage**; eliminate present exemption for outside salesmen; change conditions for exempting administrative, executive and professional employees; encourage more pension funds, and more federal-state safety programs.

• **Taft-Hartley revisions** promise to be **reserved** for political debate next year. No all-out drives are expected, either from pro or anti Taft-Hartley forces. The few

(*Continued on page* 8)



Even wood is still appropriate—in a cheerful fireplace; or charcoal in an outdoor grill. But for winter warmth, what fuel gives most comfort at least cost?

For summer coolness, shade trees are often relied on; also water evaporating on roofs. Electricity is widely used to operate mechanical cooling systems. How can its cost be reduced?

The problem is to find the fuel subject to the least loss in Btu's from Radiation, Convection, Conduction, and Vapor Flow. These four are responsible for *all* heat loss, regardless of what fuel is used or how heat is supplied.

Through wall, ceiling and floor *spaces*, the greatest amount of heat loss is by *radiation;* up to 55% for Up-Heat-Flow, 80% for Wall-Heat-Flow, and as much as 93% for Down-Heat-Flow. Little heat is lost by *conduction* through building spaces because air has slight density. *Convection* accounts for up to 45% of Up-Heat-Flow, about 25% for Wall-Heat-Flow, and Zero for Down-Heat-Flow because there is no downward Convection.

WHICH FUEL TO USE?

In the case of Radiation, regardless of the kind of fuel, heat loss is reduced by *multiple* accordion *aluminum* as each sheet successively *reflects* Radiation or heat rays back in the direction of the source at a high 97% rate, absorbing them at a low 3% rate, and emitting heat rays at a mere 3% rate.

The 3 or 5 sheets of aluminum and fiber partitions effectively retard outer and inner Convection, also regardless of the kind of fuel. Since their 4 or 6 layers of air spaces have slight density, heat loss by Conduction through them is also slight.

1,060 Btu's are lost with each pound of vapor which flows out of a building, enough to raise by 20° F the temperature of 2 rooms, 8 feet high, 13 by 14 feet in size. Thick, continuous aluminum foil, 375 feet to 750 feet long (which means mighty few breaks for infiltration of vapor), has almost *zero* permeability to vapor flow. Under its flat stapled flanges, infiltration is slight.

The new, **edge-to-edge, UNIFORM-DEPTH,** joist-to-joist Multiple Accordion Aluminum* Insulation reduces heat loss by Radiation, Convection, Conduction, and Vapor Flow at so low a cost, that—

its use in ceiling, wall and crawl spaces, or under ground floors will make ANY preferred fuel economical.

FREE! ASHACE BOOKLET AND RADIATION TABLE

How thermal losses can be reduced by successive "screens" of metal and air layers is described in the booklet, "Insulating Effect of Successive Air Spaces Bounded by Bright Metallic Surfaces" published by the American Society of Heating and Air-Conditioning Engineers. This report is well worth reading. Obtain it free—Use the Coupon.

Check coupon to get useful Table of the heat ray reflectivity of a long list of materials.

*Patent applied for.

COST OF EDGE-TO-EDGE INFRA
Multiple Aluminum Insulation
installed in new construction between
wood joists, material and labor

Type 6-PS about 10¢ sq. ft. Type 4-PS about 8¢ sq. ft.

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Please send ☐ ASHACE booklet, "Insulating Effect."
☐ Heat ray reflectivity table.

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Infra Insulation Inc., 525 Bway., N. Y. C.

WASHINGTON OVERTONES (*Continued from page 6*)

bills introduced do, however, illustrate how widely viewpoints differ on Taft-Hartley, even among members of the same political team. One bill, for example, would weaken the prohibition against secondary boycotts, wipe out state right-to-work laws, and would permit pre-hiring contracts requiring union membership after seven days of employment. Opposing, introduced by a Southern Congressman, is a bill to protect state rights in labor regulation.

School Construction, always of interest to heating and ventilating men, is another note in the political scale. What direction segregation will take has school expansion stymied in some areas; the possibility of federal grants is postponing commitments in others.

Housing Legislation is among the "must" items which must be acted upon before June 30, when some Federal Housing Administration authority would expire.

• Congress must consider **extending Title I** of the National Housing Act. This authorizes **home repair and improvement** loans. Although involved in recent investigations of "loading" by super-salesmen, continuance is expected.

• Expansion of FHA's authority to guarantee **new home loans** is also up for study. Mid-April hearings were to air the question of whether the housing boom is nearing a dangerpoint, and whether FHA should tighten up. The betting: No tightening.

Washington headquarters of the Air Conditioning and Refrigeration Manufacturers Association reports:

• Efforts continue to have Congress correct an **inequity in excise tax laws.** The 1954 revisions continued the excise tax on room air conditioners, while freeing comparable household products.

• Sale of **room air conditioners** during the first quarter of 1955, as evidenced by flow to retailers, is **up 25 to 30 percent** over the same period in 1954.

Inventories in hands of manufacturers and wholesalers are **down 12 percent,** despite heavier production and shipments. Outlook: volume for balance of this year, satisfactory; prices, erratic.

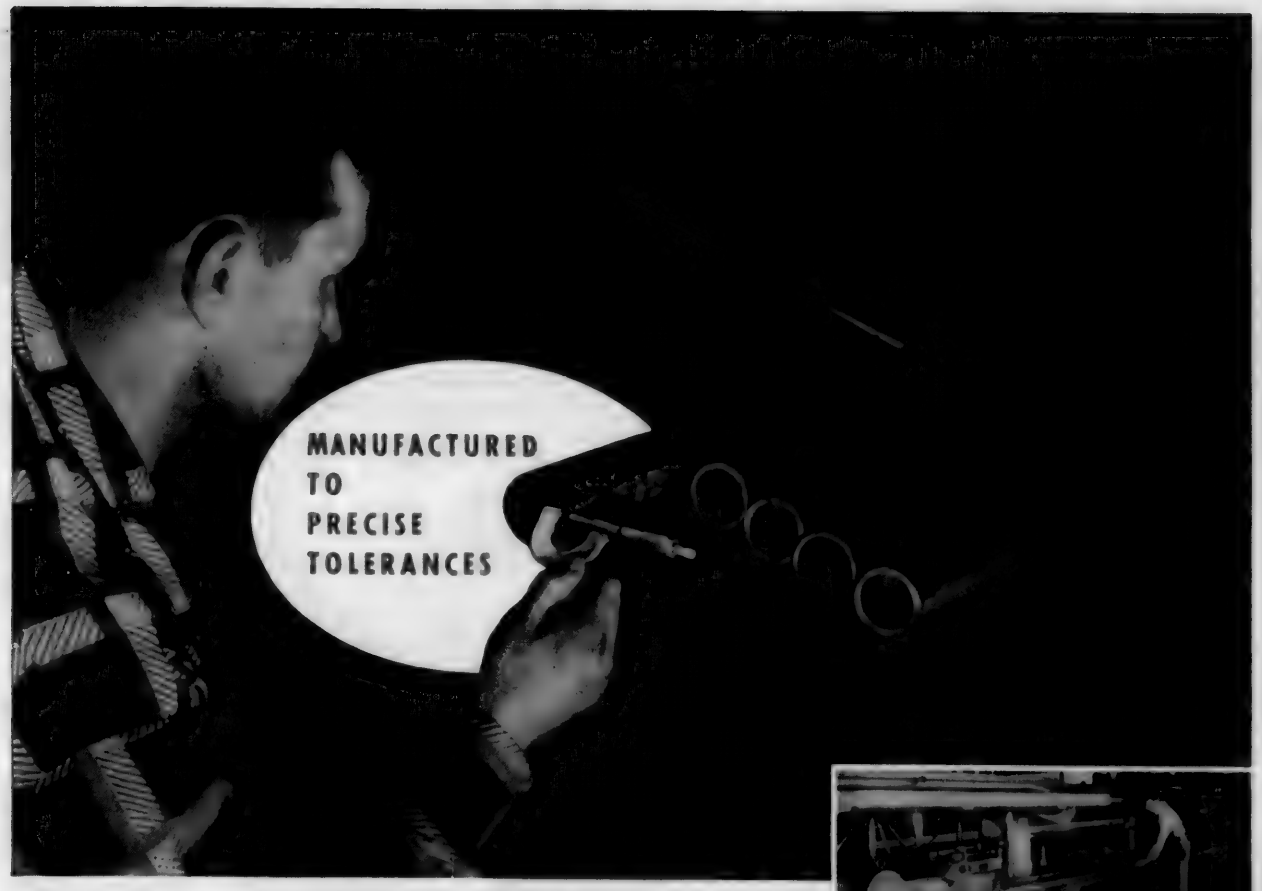
• Greatly increased promotional and merchandising activity forecast. Objective: to develop public acceptance of premise that **only a fully air-conditioned home is truly modern** home. Association considers this residential market—supplementing commercial and industrial outlets—to represent industry's greatest opportunity for future expansion."

Rules for the wholesale plumbing and heating industry; trade practice rules, that is, effective April 14, were approved by the Federal Trade Commission. Publication in the Federal Register on April 14 followed procedings held under trade practice conference procedures outlined in Federal Trade Commission Act of 1914.

Near-Record for **home building** was established in 1954; 1,220,400 new starts—11 percent above 1953 but 13 percent below 1950 record of 1,396,000.

New-Record is possible for '55. Commerce Department reports first quarter, this year, saw more money spent on more new homes than any similar period in history. Outlays for the quarter: 3.3 billion dollars; 35 percent ahead of first quarter, 1954.

New Starts also ahead for the quarter; 295,000 new dwellings started up 20 percent over '54 and 6 per cent over record first quarter 1950.



For heat exchangers and condensers . . .
COLD DRAWN WROUGHT IRON TUBING

Here's your answer to *extra life* in tubing services. Cold drawn wrought iron tubing—because its composition and structure are the same as wrought iron pipe—provides the same time-proved protection against corrosion and fatigue failure. This longer service life advantage, combined with precise tolerances, make cold drawn tubing ideal for:

- ammonia condensers
- heat exchangers
- pre-heaters
- gas cooling apparatus
- gasoline condensers
- evaporators
- cooling pipe and steam condensers
- salt and brine lines in air conditioning services

The ability of cold drawn wrought iron tubing to reduce the frequency of repair or replacement in these and similar services is amply supported by actual service records.

You'll find it profitable to investigate cold drawn wrought iron tubing for your particular installation. We will be happy to discuss your needs. Just write or call.

A. M. Byers Company, Pittsburgh, Pa. Established in 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, San Francisco. Export Department: New York, N.Y. *Available throughout the world.*

"Drawing" process—mandrel controls inside diameter and die reduces outside diameter as tubing is drawn. Interior and exterior of tubing are smoothed in process.

Annealing process restores ductility of the tubing. Ring gauge is then used to check OD, followed by a micrometer reading for wall thickness.

BYERS

CORROSION COSTS YOU MORE THAN WROUGHT IRON

WROUGHT IRON

TUBULAR AND HOT ROLLED PRODUCTS

ELECTRIC FURNACE QUALITY STEEL PRODUCTS

BRIEFLY STATED

• Baker, Smith & Co., Inc., has announced the promotion of Benjamin S. Bacon to the position of vice chairman of the board and the election of Bruce A. Jacobi as president and Leighton B. Young as vice president. Mr. Bacon's election to vice chairman coincided with his completing fifty years of service with the company. Mr. Jacobi was formerly chief engineer of Lerner Stores Corp. He has had wide experience as a mechanical engineer and engineering consultant since his graduation from the Carnegie Institute of Technology in 1938. He supervised the design and construction of industrial and commercial piping, air conditioning, heating, ventilating, electrical systems and plumbing in 234 installations throughout the country during an extensive postwar expansion program. He has also acted as engineering advisor for the construction of the Fontainebleau and Sans Souci Hotels in Miami Beach, the Memorial Hospital for Cancer and Allied Diseases, and the Broadway Baptist Church in Paterson, New Jersey. He had had considerable experience with mechanical design of airports, marine propulsion equipment and industrial projects. Prior to World War II, Mr. Jacobi was associated with Johnson and Morris, mechanical contractors, and supervised installations at the Italian and Polish pavilions at the New York World's Fair. He has been a contributor to AIR CONDITIONING, HEATING AND VENTILATING.

• Johnson Service Co., Milwaukee, manufacturers of automatic temperature control systems, has announced the opening of new branch offices at Akron, Ohio; Mobile, Alabama; New Haven, Connecticut; Sacramento, California; Springfield, Massachusetts; Tampa, Florida; Wilkes-Barre, Pennsylvania; and Youngstown, Ohio. The new offices bring to 97 the number of direct branch offices which sell, plan, install and service the company's automatic temperature and air conditioning control systems.

• A new $13 million brass mill in Los Angeles County, Calif., will soon be under construction by The American Brass Company, it was recently announced by John A. Coe, Jr., president of the Waterbury, Conn., firm. The new mill will be built for the production of copper and copper-base alloys, in the form of sheet, strip, rod, tubing and drawn copper products. C. Russell Epley has been named manager of this new facility. Formerly Mr. Epley was San Francsico district sales manager. The company will have a total of twelve factories in the U. S. upon completion of the Los Angeles plant, and when a recently-announced $25 million aluminum plant at Terre Haute, Ind., and a $2.5 million production facility for flexible metal hose and tubing at Mattoon, Ill., are finished.

• Charles E. Beaver, general sales manager, has been elected a vice president of Research-Cottrell, Inc., manufacturer of electrical precipitation equipment. Schaeffer E. Specht, formerly sales engineer was named assistant sales manager.

• The 31-story main office building of Bankers Trust Company, at 16 Wall Street, New York City, topped off by a unique 6-story tower of stepped stones, known as the Pyramid, will be air-conditioned. S. Sloan Colt, president, in making the announcement said that a contract covering the work has been awarded to Turner Construciton Company. Meyer Strong and Jones are the consulting engineers. The installation will be completed in the spring of 1956.

• Jack D. Tolliver has been appointed manager of the recently established Sales Development Division of Tube Turns, Louisville, Ky. The Sales Development Division succeeds the company's Engineering Service Division, formed in 1945, and will be staffed with the same personnel. Mr. Tolliver obtained his B.S. degree in mechanical engineering at the University of Louisville in 1949. After graduation he joined Tube Turns as an engineering-sales trainee. He was assigned to the Engineering Service Division in 1950 and became assistant manager in 1954.

• H. N. McMenimen, Jr., has been appointed manager-sales for General Electric Air Conditioning Division. Mr. McMenimen will continue his responsibility as northeastern regional manager for the division which he assumed five years ago, and will move his office from New York City to Bloomfield, New Jersey, where G.E. air conditioning headquarters is located.

• Norman W. Stunkard, former assistant chief engineer of Iron Fireman Manufacturing Company's Electronics Division, Portland, Oregon, has been named manager of Iron Fireman's Swenson Thermal Research, Inc. plant in Cleveland, which produces the new SelecTemp heating system.

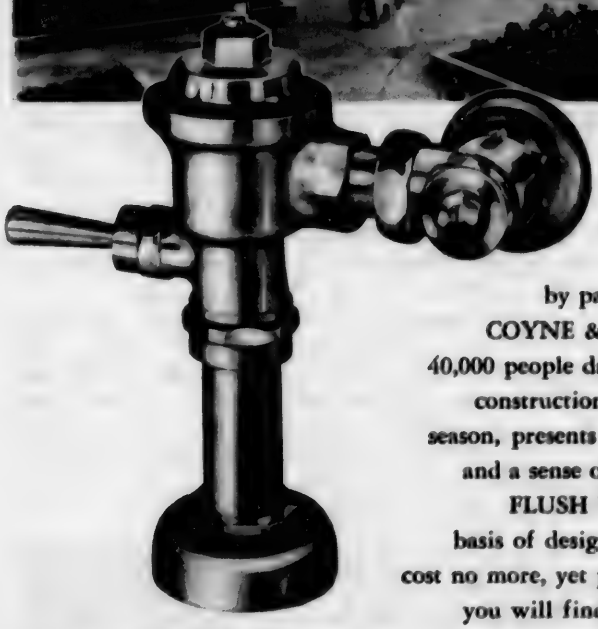
• During each of the next two years an additional one and one-quarter million homes in the United States will install gas heating equipment according to the most recent gas househeating survey made by the American Gas Association. These new installations will bring the total number of gas heated homes in the nation to 16½ million by the beginning of the 1956-57 winter season.

• C. Harold Berry, Gordon McKay Professor of Mechanical Engineering at Harvard University and a leader in the field of heat engineering, will retire this summer. Prior to joining the Harvard faculty in 1928, Professor Berry had served as assistant to the Chief Engineer of the Detroit Edison Co., and as Associate Editor of Power magazine. Recently he was appointed to a committee advisory to the Director of the National Bureau of Standards in the field of heat and thermodynamics. Professor Berry has been a frequent contributor to various technical publications and is the author of a book, Flow and Fan (published by The Industrial Press, 1954) dealing with ventilating systems. The book is an outgrowth of a series of lectures presented at the Harvard School of Public Health. Professor Berry is a Fellow of the American Society of Mechanical Engineers and of the American Academy of Arts and Sciences, a member of the National Society of Professional Engineers, the engineering honor fraternity, Tau Beta Pi, the Society of the Sigma Xi, the Harvard Club of Boston and the Harvard Musical Association. He is a past chairman of the Detroit and Boston sections of the ASME and served as Secretary-Treasurer of the Metropolitan Section in New York.

(Continued on page 12)

And in Detroit — A FUTURE OF FAULTLESS SERVICE

NORTHLAND REGIONAL SHOPPING CENTER
Detroit, Michigan
VICTOR GRUEN ASSOCIATES, INC.
architects and engineers
H. E. BEYSTER & ASSOCIATES
associated mechanical engineers
DONALD MILLER COMPANY
plumbing contractor
MURRAY W. SALES & COMPANY
wholesale distributor
AMERICAN RADIATOR & STANDARD SANITARY CORP.
plumbing fixtures manufacturer



Already considered a classic in shopping center design, J. L. Hudson's $25,000,000 Northland Center is the largest of its kind anywhere. Surrounded by parking space for over 7,500 cars, this highly acclaimed COYNE & DELANY installation provides "one-stop" shopping for 40,000 people daily. Notable for five years of planning before construction, Northland flies its own flag, changes its gardens by the season, presents the shopper with lighthearted outdoor sculpture and a sense of leisure. COYNE & DELANY CO. is proud that its FLUSH VALVES were selected for this pace-setter project on the basis of design and actual test trials. Because DELANY VALVES cost no more, yet provide that extra measure of performance, you will find DELANY — "the fastest growing name in flush valves!"

This new "HAND BOOK and CATALOG No. 53" is the most comprehensive of its kind—designed for everyday reference . . . 19 pages of installation details for exposed, concealed and special FLUSH VALVE installations . . . over 75 blue prints . . . cut away views . . . many pages of charts, formulae, piping details . . . sent free, if requested on firm letterhead.

COYNE & DELANY CO. • 834 KENT AVE. • BROOKLYN, NEW YORK

IN CANADA: THE JAMES ROBERTSON CO., LTD.

DELANY *Flush* **VALVES** Since 1879

Briefly Stated (*Continued from page* 10)

• W. A. Roberts, president of Allis-Chalmers Manufacturing Co. since February, 1951, died suddenly April 12 following a heart attack. He was 57 years old. Mr. Roberts began his career with Allis-Chalmers in 1924 as a salesman for the firm's tractor branch in Wichita, Kansas. In 1926, the company transferred him to Canada as Canadian sales representative. Mr. Roberts came to the company's Milwaukee headquarters in 1930 as agricultural sales manager of the tractor division. The following year he was advanced to general sales manager. In March, 1944, Mr. Roberts became vice president in charge of the company's tractor division. He was elevated to executive vice president in charge of that division in 1947. In January, 1948, he became a director, and in March, 1948, a member of the board's executive committee.

• L. J. Wing Mfg. Co., Linden, N. J., manufacturers of heating, ventilating and combustion equipment, announce new officers following the retirement of Walter W. Wilson, vice president and treasurer. The officers now comprise H. S. Wheller, president and general manager; C. H. Smith, vice president and treasurer; H. S. Wheller, Jr., vice president and secretary; T. R. Peyrek, vice president in charge of Heating and Ventilating Division; and C. R. Mayer, assistant treasurer.

• Hal H. Rhea has been named manager of the Residential Air Conditioning Development Department at Carrier Corp. Mr. Rhea has been senior engineer in the department for the past three years. He assumes the duties of William Hood, who has been appointed acting director of engineering for the Unitary Equipment Division.

• The Operation Success television program with interviews conducted by Quentin Reynolds recently featured Alexander Schwartz, president of Infra Insulation, Inc., and Thomas J. Watson, Jr., of I.B.M., on WRCA-TV in New York. Questioned by Mr. Reynolds, Mr. Schwartz explained the various ways in which heat flows; how barriers to heat and vapor flow can be erected so as to reduce discomfort in hot as well as cold weather. The specially designed machinery which turns out Infra insulation was shown in action. The program was filmed, and will be released to local stations all over the country.

• The Trane Company of LaCrosse, Wis., has announced the election of three executive vice presidents to broaden the management staff for further growth of the firm. Stockholders also increased the board of directors from six to seven. Elected as executive vice presidents were: R. James Trane, who is also president of Trane's wholly-owned subsidiary, the Trane Company of Canada, Ltd., at Toronto; Wayne J. Hood, who has been vice president and treasurer, and Thomas J. Hancock, who has been vice president in charge of sales. Richard H. Pearse, Sr., purchasing agent, was elected to the position of vice president. Mr. Hancock was named to fill the new position on the board of directors. Mr. Trane and Mr. Hood have been directors for several years. Each of the new executive vice presidents will continue his present responsibilities.

• The W. A. Case & Son Manufacturing Co., with headquarters in Buffalo, N. Y., has announced three new top-level executive appointments. Raymond J. Nuber has been elected president of the 102-year-old firm. He succeeds Nathan J. Higinbotham, who has retired after heading Case for 29 years. Mr. Nuber has been an executive of Case for 28 years. His most recent post has been senior vice president in charge of branch house operations. The company has named Cecil W. Farrar vice president, general sales. Mr. Farrar returned to Case in 1953 after nine years as vice president and general sales manager of the Richmond Radiator Company, New York City. On his return, Mr. Farrar took charge of Case sales, became advertising manager and on October 1, 1954, was made a director of the company. John M. Higinbotham becomes vice president, branch house operations. Mr. Higinbotham joined Case in 1953 as assistant to the president, coming from Republic Steel where he had been 20 years in tubular sales.

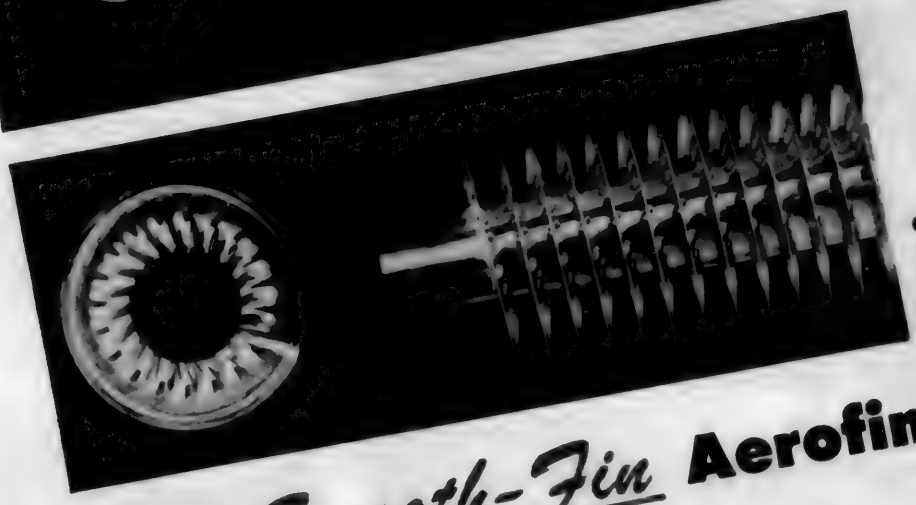
• The Niagara Blower Company has announced the election of Martin H. Olstad as vice president in charge of engineering and William M. Mosler as secretary. The position to which Mr. Olstad has been named is a newly created one. He has been with the company since 1929 and has for the past ten years been its chief engineer. His office is with the New York City offices of the company in the Chrysler Building. In the position of secretary, Mr. Mosler succeeds Albert J. Harlock, one of the founders of the company, who has retired.

• A complete revision of NFPA Standard No. 31 which outlines the safe installation requirements for all oil burning equipment from portable kerosene heaters to large manually operated industrial type burners, will be submitted for official adoption by the National Fire Protection Association at its Annual Meeting in Cincinnati May 16 to 20. The NFPA Committee on Flammable Liquids has been at work on the new standard for over two and one-half years. Last revised in 1954, in part only, the new NFPA No. 31 treats such items as clearances to combustible construction, installation of fuel pipes, amount of air needed for proper combustion draft requirements, tank installations including drums used for supply and storage, and construction and installation features for space heaters and cooking appliances. The recommended revised text of NFPA No. 31 is contained in the Advance Reports of the NFPA, available from its executive offices, 60 Batterymarch St., Boston, Mass.

• M. Nielsen, vice president of The Babcock & Wilcox Co., was today elected by the board of directors to the newly created post of executive vice president of the company. He was also reelected to the board. Mr. Nielsen joined Babcock & Wilcox in 1924 and has had wide experience in the erection, contract and manufacturing departments of the company. In 1950 he was made an executive assistant and placed in charge of the company's contract department. He was elected an assistant vice president in 1952, vice president in charge of the manufacturing department of the Boiler division in 1953 and vice president in charge of the entire Boiler division in January 1954, which position he held previous to his present promotion.

New Smooth Fins

Wide base provides ample contact surface. Smooth fins can be closely spaced without increasing resistance.



Old Type Fins

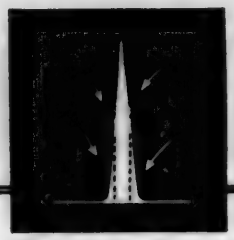
Crimped to provide necessary contact surface, widely spaced to reduce air friction.

NEW *Smooth-Fin* Aerofin Coils for Greater Capacity— Lower Resistance

Aerofin extended-surface heating and cooling coils now offer you an even greater area of effective surface — even greater capacity — per square foot of face area. Airway resistance is lowered; higher air velocities can be used. The result is extremely high heating or cooling capacity in a given space.

Compact, sturdy, standardized encased units arranged for simple, quick, economical installation.

Write for Bulletin S-55



The new Aerofin smooth fins are tapered, with wide base that conducts sufficient heat between fin and tube to make the entire fin effective transfer surface.

AEROFIN CORPORATION

101 Greenway Ave., Syracuse 3, N. Y.

Aerofin is sold only by manufacturers of fan system apparatus. List on request.

BALL HIGH SCHOOL, GALVESTON, TEXAS • See Rear View Below

Architects for both buildings
PRESTON M. GEREN,
Fort Worth, Texas
R. R. RAPP,
Galveston, Texas

Mechanical Engineers
YANDELL, COWAN & LOVE
Fort Worth, Texas

Plumbing and Heating Contractor
A. J. WARREN
Galveston, Texas

Powers automatic temperature control is used throughout both schools which are alike in facilities and general design. Both have modern gym, cafeteria, swimming pool and showers. Photos below indicate excellence of interior design.

Drama and Public Speaking Classroom

Below: CENTRAL HIGH SCHOOL, GALVESTON, TEXAS

Relaxation Area near Cafeteria Entrance

Maximum Schoolroom Comfort and Fuel Economy is Assured by Powers Control

(c-15)

They kept it simple... in these modern Galveston schools

Heating . . . Ventilating . . . Showers . . . Water heaters are all regulated by

POWERS *Temperature Control*

One dependable Source, **one responsibility, for satisfactory performance and service if required, is one of the many reasons why so many buildings are equipped throughout with Powers temperature control.**

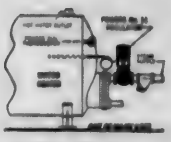
Chemistry Lab

Auditorium

Civics and History Classroom

Home Economics Classroom

Each School has Individual Room Control of heating and ventilating.



Powers No. 11 Regulators Control Domestic Water Heaters also Swimming Pool Heaters.

Boys and Girls Showers also are Thermostatically controlled by Powers

When you want automatic temperature control with the time-tested-and proven-dependable features of Powers regulation, call our nearest office or write us direct.

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Over 60 years of Automatic Temperature and Humidity Control

Control-Motor-Drive

Save Engineering

ALLIS-

...Simplify Service

These Components are Designed to Work Together and They're Backed by Nation-Wide Service

Cut Engineering Time and Cost. Select all components for your complete drive... motor, control and *Texrope* V-belt drive... from one source. All ratings are coordinated to make selection easier. Parts match up properly.

Reduce Installation Costs. Parts fit together easily at assembly because they are designed and built to be used together... to fit a single set of standards. And, of course, you have one responsibility for the performance of the complete drive unit... one reliable guarantee of satisfaction.

Get Nation-Wide Service. Allis-Chalmers continues to serve you and your customers after your equipment is installed. In addition to 76 district offices, there are almost one hundred Certified Service Shops located in every industrial area in the country. These shops are carefully selected, independent shops that use only factory-approved parts and methods in servicing Allis-Chalmers equipment.

For an experienced specialist to help you select the best drive for your installation... for coordinated equipment... call your nearby Allis-Chalmers District Office, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4691

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Squirrel-Cage Motors	51B6210
TEFC Motors	51B7225

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CHALMERS

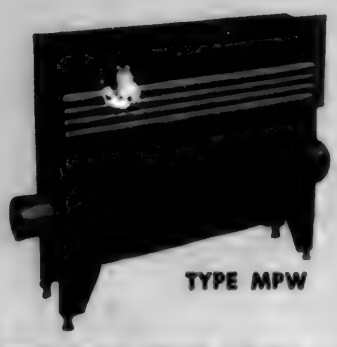
Texrope is an Allis-Chalmers trademark.

A-C ALLIS-CHALMERS

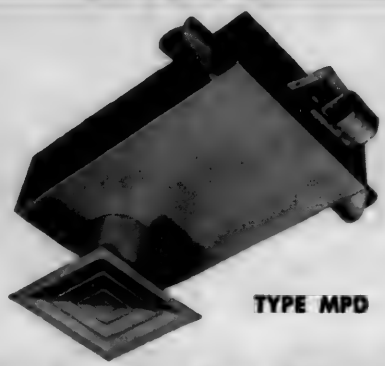
Air Conditioning Systems are on a diet...

thanks to

Tuttle & Bailey High Pressure Air Distribution Units



TYPE MPW



TYPE MPD

T&B HIGH PRESSURE INSTALLATIONS INCLUDE: Bethlehem Steel Co., Bethlehem, Pa. • Dallas County Building, Dallas, Texas Dearborn Bank, Dearborn, Mich. • Decatur-Macon County Hospital, Decatur, Ill. • General Telephone Exchange, Chicago, Ill.

IF YOU can reduce the space you need for an air conditioning system, you can obviously effect substantial savings in the over-all cost of a building. With a high pressure air conditioning system, you can do just that.

Small, low-cost conduit-type risers and branch feeders add more usable or rentable floor space, reduce floor-to-floor dimensions, and require fewer supplementary equipment rooms.

High pressure is the ideal type of air conditioning system for new multi-story office buildings, schools, hospitals, hotels, and institutions. It is also *particularly* well suited to installation in existing buildings where high pressure eliminates the need for major remodeling. In fact, in many older buildings, such a system is the *only* answer to air conditioning.

A pioneer in the development of the high pressure theory, Tuttle & Bailey manufactures a complete line of equipment to meet the varied requirements of a wide range of buildings and types of construction. Tuttle & Bailey Units include single and double duct wall and ceiling types for individual unit or zone control, and are capable of handling branch duct velocities up to 4000 feet per minute.

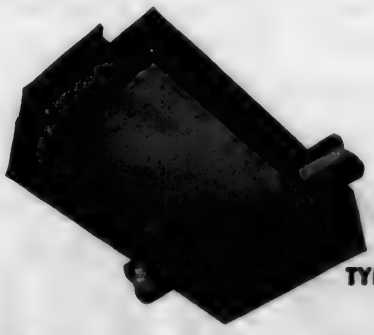
The units shown below typify the Tuttle & Bailey line which is backed by extensive on-the-job experience, and one of the best-equipped Research Laboratories in the industry where T&B engineers can duplicate field conditions and pretest equipment and thus offer maximum assistance to architects and engineers.

To learn how you can take advantage of Tuttle & Bailey's high pressure know-how, get in touch with your nearest T&B Representative or the Home Office.

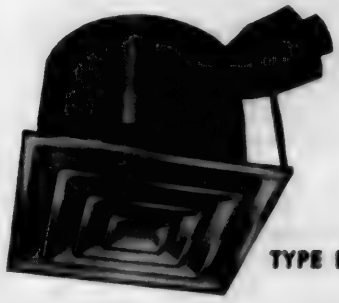
For information on the complete line of Tuttle & Bailey High Pressure Air Distribution Units, write for Bulletin 109.

TUTTLE & BAILEY inc

NEW BRITAIN, CONN.

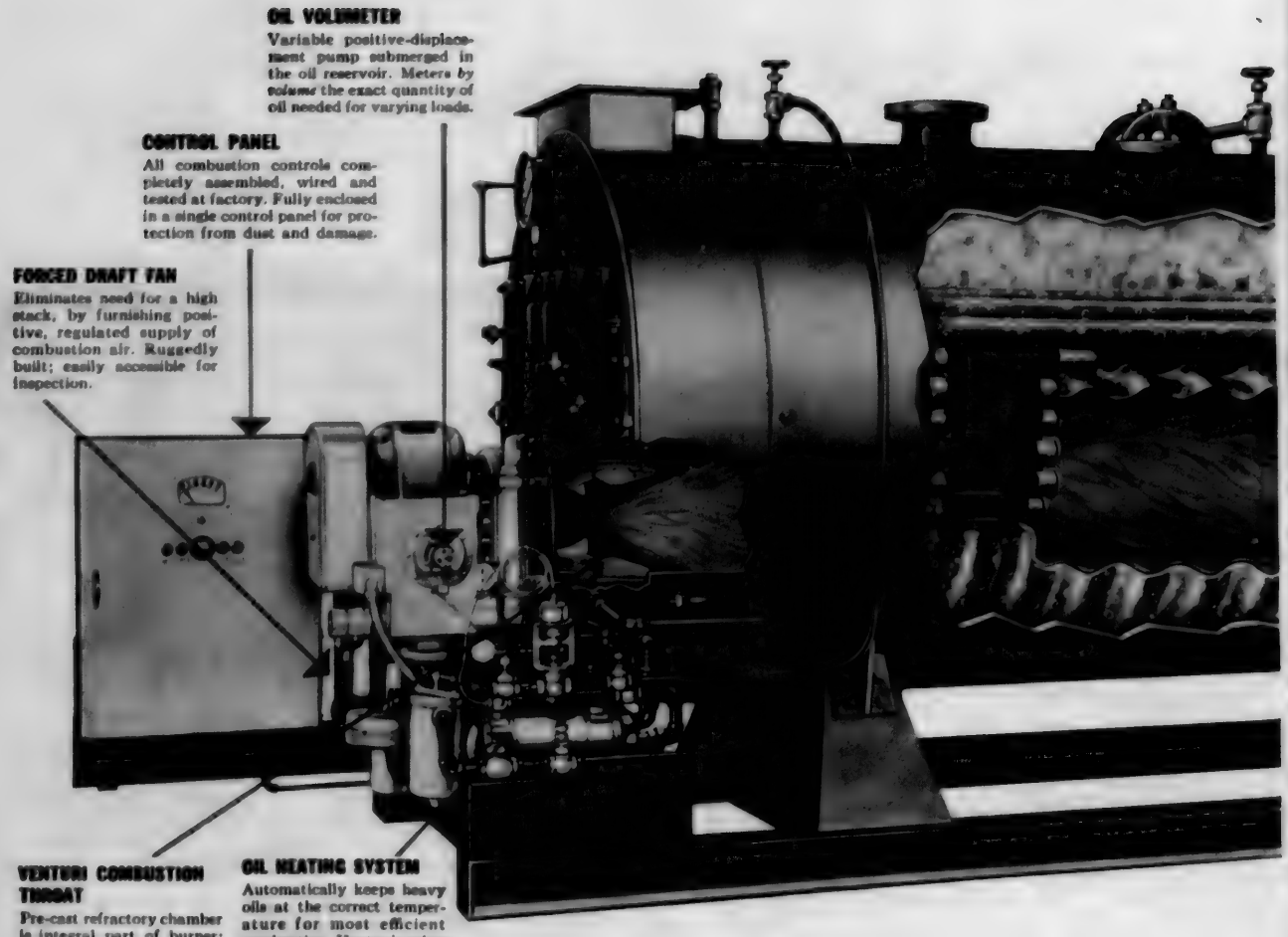


TYPE MP



TYPE HPD

IBM World Headquarters, New York, N.Y. • Latter Day Saints Society Building, Salt Lake City, Utah • Lever House, New York, N.Y. People's National Bank, Little Rock, Ark. • Seamen's Bank for Savings, New York, N.Y. • Sinclair Oil Building, Tulsa, Okla.


OIL VOLUMETER
Variable positive-displacement pump submerged in the oil reservoir. Meters by volume the exact quantity of oil needed for varying loads.
CONTROL PANEL
All combustion controls completely assembled, wired and tested at factory. Fully enclosed in a single control panel for protection from dust and damage.
FORCED DRAFT FAN
Eliminates need for a high stack, by furnishing positive, regulated supply of combustion air. Ruggedly built; easily accessible for inspection.
VENTURI COMBUSTION THROAT
Pre-cast refractory chamber is integral part of burner; eliminates on-the-job brick work.
OIL HEATING SYSTEM
Automatically keeps heavy oils at the correct temperature for most efficient combustion. Heater is tubular multiple-pass type; with temperature control instruments and necessary valves.

Perfectly balanced firing

IT HAS TO BE PLANNED

Iron Fireman firing systems are available as complete package boiler-burner units of the type shown above, or as separate package burners for installation in your present boilers.

No mere conversion burner, these package burner units contain every component for balanced firing: single or dual-fuel systems and burners, forced draft air supply, built-in combustion refractory, completely wired and tested controls.

Iron Fireman burner units are carefully assembled and tested at the factory. This means the kind of continuing dependability and operating efficiency seldom achieved with local assembly.

INSTALLATION SAVINGS, TOO

Long-range savings should be the main consideration in your choice of a firing system. But don't overlook the *installation savings* that you can also make with an Iron Fireman package burner. There's little more involved than bolting to the boiler front, and making fuel and electrical connections. Iron Fireman package burners are engineered for firing practically all types of steam and hot water boilers.

FOR OIL OR GAS, OR BOTH

Iron Fireman package burners with dual-fuel systems

Iron

OIL, GAS OR COAL

DeVilbiss plant finds that Iron Fireman complete fuel burning systems provide higher efficiency, greater cleanliness

This photograph of the DeVilbiss boiler room at Barrie, Ontario, Canada, shows two Iron Fireman boiler-burner combination units installed there last year. Officials report performance has been highly satisfactory. Installation was made by Tewes Engineering, Toronto, Ontario.

is no accident . . .

can bring greater economy to your operations in two important ways. First, you can take full advantage of seasonal fuel price cuts. And second, in event of emergency fuel shortages you can rapidly switch over *without* expensive shut-downs. Controls are actually changed from one fuel to another with just the flick of a switch!

Gas of any type is effectively burned with the Iron Fireman ring type gas burner. And he horizontal rotary oil burner, shown above, brings you steady and economical power with heat-rich heavy oils.

GET COMPLETE INFORMATION

Fuel savings . . . installation savings . . . dependable long-range operation. Certainly these features belong in *your* plant.

For complete technical information on the Iron Fireman package burner, send the coupon.

Fireman®

FIRING FOR HEATING, PROCESSING, POWER

IRON FIREMAN MANUFACTURING CO.
3066 West 106th Street, Cleveland 11, Ohio

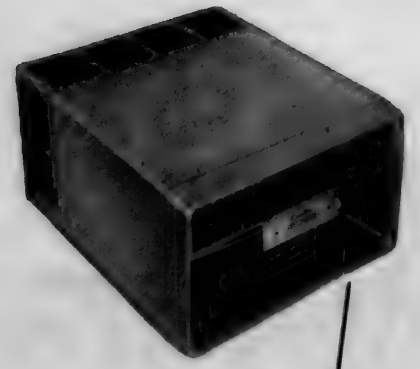
In Canada, write 80 Ward Street, Toronto, Ontario.

Please send detailed information on Iron Fireman package burner units for oil, gas, or oil-gas dual firing.

Name _____

Address _____

City _____ State _____



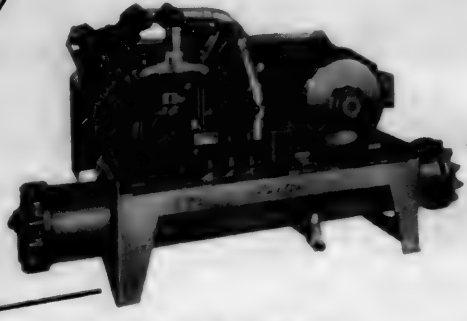
Window Air Conditioners

Packaged Air Conditioning units—2 to 20 tons

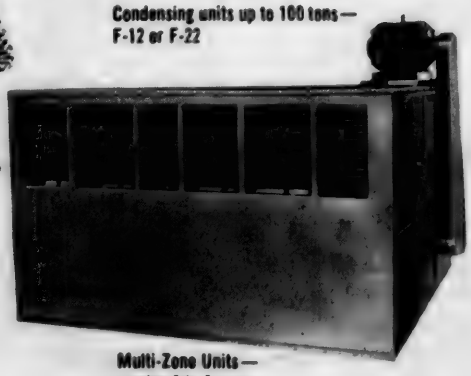
More jobs... More profit!

WITH THIS

complete Curtis LINE

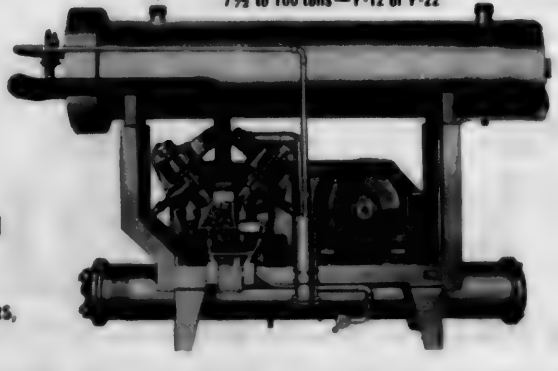


Condensing units up to 100 tons—F-12 or F-22



Multi-Zone Units—serving 2 to 8 zones

Packaged Liquid Chillers—7½ to 100 tons—F-12 or F-22



You'll sell more jobs, and make more profit, with this well-rounded Curtis line. Curtis equipment sells readily because it is backed by one of the oldest and most respected names in the business. Curtis products are presold for you by hard-hitting national advertising in *Saturday Evening Post, Time* and *Newsweek*, plus many national business and trade magazines.

WRITE TODAY for information on how you can obtain a Curtis direct factory franchise.

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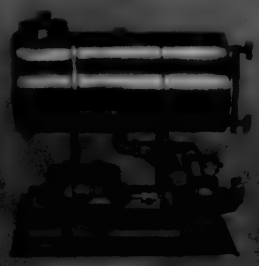
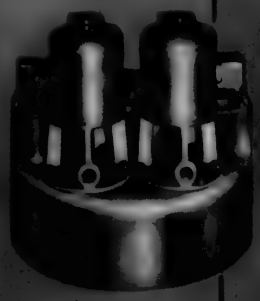


"TM" TURBINE PUMP
Designed for boilers up to 300 hp and discharge pressures up to 100 lbs.

"UV" CONDENSATE PUMP
Capacities ranging from 2,000 to 40,000 sq. ft. EDR, and discharge pressures from 10 to 75 lbs.

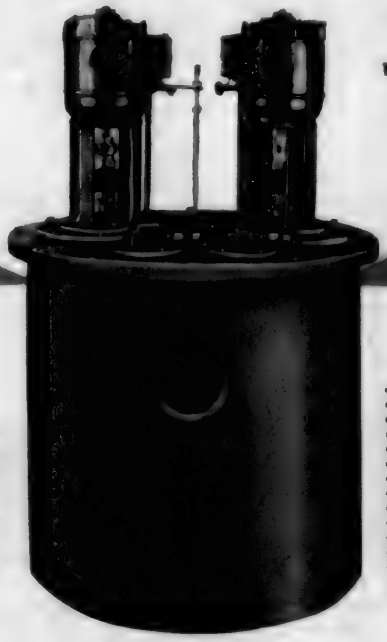


"UV" VERTICAL PUMP
Heavy duty duplex unit with two steel verticals. Capacities ranging from 800 to 10,000 sq. ft. EDR and discharge pressures from 10 to 25 lbs.

"SV" VERTICAL PUMP
Capacities ranging from 800 to 10,000 sq. ft. EDR and pressures from 10 to 25 lbs.

Skidmore Pumps
a type for every need
— CHOOSE WITH CONFIDENCE

"HS" CONDENSATE PUMP
Capacities ranging from 1,000 to 40,000 sq. ft. EDR and discharge pressures from 10 to 75 lbs.



TYPE "UV" DUPLEX PUMP

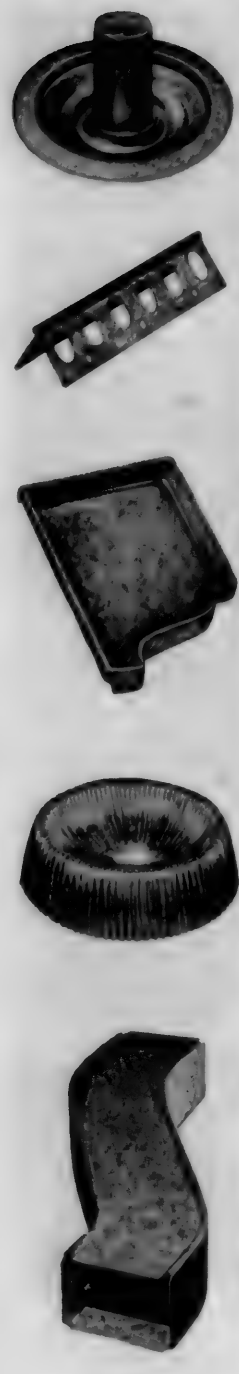
TYPE "UV"—Duplex Unit Recommended for below floor level returns. The duplex pump consists of one cast iron receiver — two pumps, two motors and complete float mechanisms. Each pump of the duplex unit is mounted on its own plate . . . either pump may be removed for inspection without disturbing the second unit.

Write for Bulletin No. 19-A

Contains complete data on both the single and duplex units. Bulletins on other pumps sent on request.

SKIDMORE PUMPS

SKIDMORE CORPORATION • ST. JOSEPH, MICHIGAN



A CHALLENGE!

THE STRONGEST MADE BY ANY GALVANIZED SHEET:

Anything that

If you've been having difficulty fabricating galvanized sheets, try Wheeling SOFTITE Galvanized Sheets.

Here are sheets you can work to the limits of the base metal . . . so ductile, so tight-coated, you can use them for anything you make of steel sheets.

Bead it, draw it, seam it . . . you name the operation . . . Wheeling SOFTITE will take it and come back for more . . . with never a trace of chipping or flaking of coating. And for good reason — SOFTITE *has the tightest zinc coating yet produced.*

Put SOFTITE to the test. See for yourself why the demand for SOFTITE has forced Wheeling to triple its production facilities in 1955.

Galvanized steel does it better . . . SOFTITE *does it best!* Send for full information today. Call or write the Wheeling sales office nearest you.

IT'S WHEELING STEEL

can be made of steel sheets

can be made of

WHEELING

SOFTITE®

galvanized sheets!

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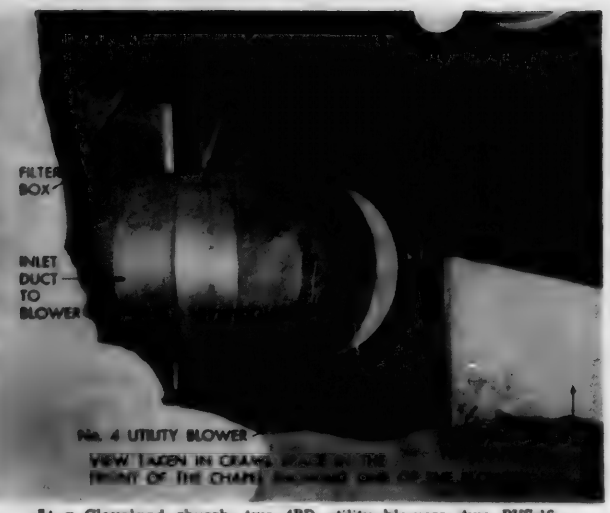
WHEELING, WEST VIRGINIA

District Sales Offices

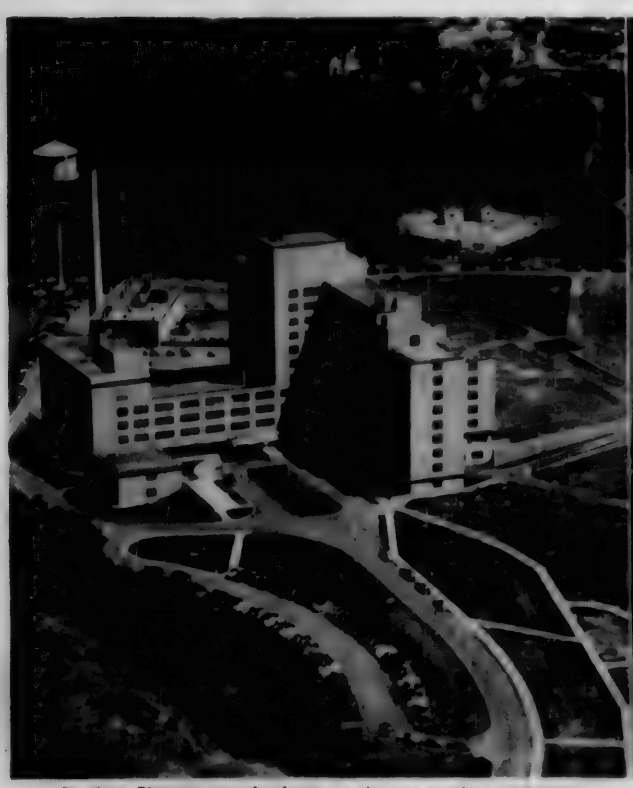
ATLANTA, BOSTON, BUFFALO, CHICAGO, CINCINNATI, CLEVELAND, DETROIT, HOUSTON, NEW YORK, PHILADELPHIA, ST. LOUIS, SAN FRANCISCO

Heat and moisture created by steaming and drying operations in this knitting mill are reduced with 15 Peerless PVS-18 Exhaust Fans. Paint damage was eliminated and plant efficiency was improved.



At a Cleveland church, two 4BD utility blowers, two PVS-16 and one PVS-24 exhaust fans create a flexible cooling system during services. The system produces a complete change of air every 5 minutes.

AIR MOVING PROBLEMS SOLVED WITH FANS AND BLOWERS



Peerless Blowers are the heart of the air moving equipment in this modern Veteran's Administration Hospital at Wilkes Barre, Pa. To insure maximum quiet, all units are mounted in the basement.

These four Peerless Blowers are an integral part of the air conditioning equipment at a modern Chicago Hospital. They deliver air to operating, examining and X-ray rooms. Four No. 3½ blowers are used for exhaust purposes.

FAN AND

THE PEERLESS ELECTRIC COMPANY

FANS · BLOWERS · ELECTRIC MOTORS

● Sound engineering and top-quality construction help cut installation costs and eliminate expensive call backs wherever Peerless Electric fans or blowers are specified and installed.

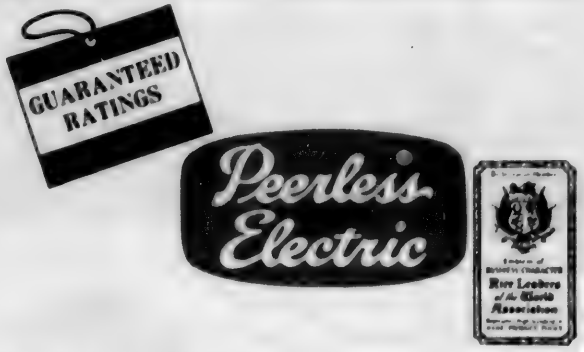
Peerless products are engineered from start to finish for trouble-free performance. Peerless Electric is one of the few fan and blower manufacturers to produce its own motors. The result is job-matched

PEERLESS ELECTRIC

motors that deliver the ratings listed and guaranteed by Peerless Electric. Peerless accuracy permits you to specify and install the proper sized fan or blower. There's no need to pick the next bigger size for insurance. You bid lower and land more jobs.

The clincher on any air moving job is a well engineered installation. To insure complete customer satisfaction and help you make more sales, Peerless gives you any engineering aid you require. A letter or phone call to Peerless Electric or your nearest respresentative will be handled quickly.

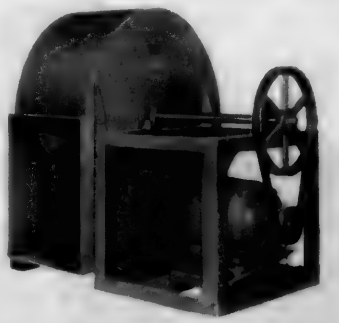
If you are installing fans or blowers, you should have both Peerless Electric catalogs—SDA-160 and SDA-200. Write for them today. They're your guide to bigger profits in the booming air moving market.



BLOWER DIVISION

1400 W. MARKET ST. • WARREN, OHIO

• ELECTRONIC EQUIPMENT



NON-OVERLOADING BELT DRIVE UTILITY BLOWER—Sizes from 12½" to 36½"; 686 to 26,044 CFM. Quiet operation. Motors built and job-matched by Peerless.

DIRECT DRIVE UTILITY BLOWER—Sizes 4½" thru 12". Job-matched Peerless motors; clockwise rotation. Compact, easy to mount. Quiet operation. Ideal for use with ducts.

TYPE PVB INDUSTRIAL EXHAUST FAN—24", 30", 36", 42" and 48" sizes. Totally enclosed ball bearing motors. For duty in extreme dust and humidity. Vertical or horizontal mounting.

TYPE PVS EXHAUST FAN—CFM ratings from 2,150 to 8,800. Single or two-speed control. Totally enclosed motor. Mounts vertically or horizontally with 4 or 6 lag screws.

AMONG SEVERAL REASONS IS THIS IMPORTANT ONE: a Yorkaire System is the *right kind* of air conditioning . . . custom-tailored to the building.

That's why you'll find York cooling in 27 of Miami Beach's largest, best hotels (not to mention the leading hotels in Miami proper). As in all large buildings, glass areas and heat loads and floor areas and numbers of rooms, economic considerations, taxes, depreciation and many other factors varied from hotel to hotel, up and down the Beach. So obviously no one system—or even two or three —could do the job best for every hotel. That's why York engineered each system to fit the particular hotel in which it is installed.

You can apply this knowledge and experience to your building by calling your York District Office (located in principal cities and listed in the classified phone book). York Corporation, York, Pa.

HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885

Why have 27 of Miami Beach's largest, newest hotels installed Yorkaire Systems of air conditioning?

IF YOU ARE ABOUT TO AIR CONDITION ANY BUILDING . . . *consult with experienced York Engineers as so many others have done. York brought the right kind of cooling to the Empire State Building and to Cincinnati's Netherland-Plaza Hotel, for example—and, of course, to the 27 Miami Beach hotels shown on the map below. Recent contracts include Denver's new and exciting Mile High Center, the Equitable Life Assurance Society Building in San Francisco, the new Webb & Knapp 34th Street Office Building in New York City and Philadelphia's fabulous new Penn Center.*

York refrigeration air conditioning

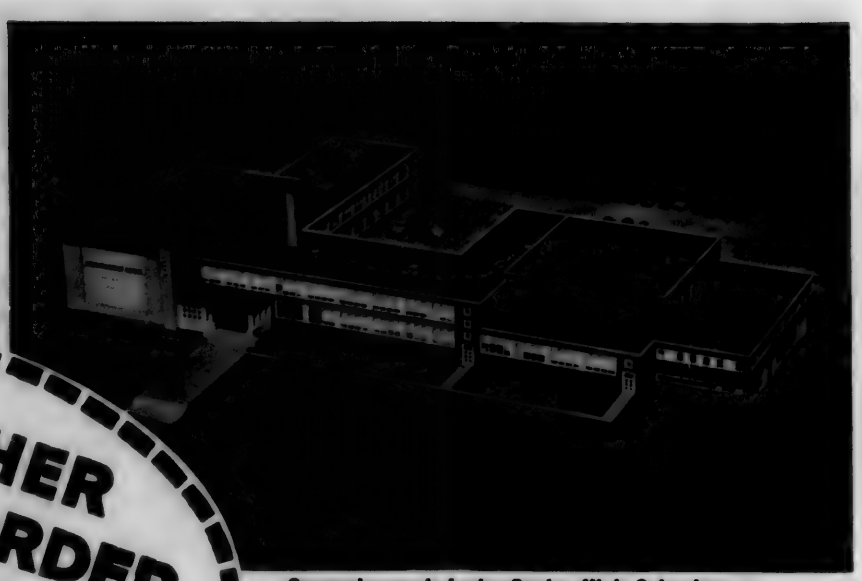
YORK CORPORATION

the quality name in air conditioning

HEADQUARTERS FOR MECHANICAL COOLING SINCE 1885

The most convincing stamp of user satisfaction

ANOTHER REPEAT ORDER FOR SARCO



Susquehannock Junior-Senior High School Southern York County, Pa. *Architect:* Buchart Engineering Corp. *Engineers:* W. K. Hood & Associates. *Heating Contractors:* J. L. Thomas. *Plumbing Contractors:* C. C. Kottcamp & Son.

21 times in two years

Buchart Engineering Corporation Specifies Sarco Heating Specialties for School Projects

PLAIN TALK! Here's what the Buchart Engineering Corp., York, Pa., School Designers, has to say about the dependability of Sarco Heating Specialties:

"...all our school projects equipped with Sarco traps, temperature regulators, water blenders and heating specialties have had satisfactory, dependable service throughout the years."

Sound reason why Sarco products were specified and installed in 21 schools designed by the firm during the last two years.

This record of confidence is convincing testimony to the dependability of Sarco Heating Specialties.

Why not specify Sarco on *your* next project and be assured of the same dependable performance.

Full information on all Sarco products is available on request. SARCO COMPANY, INC., Empire State Building, New York 1, N. Y. Representatives in principal cities.

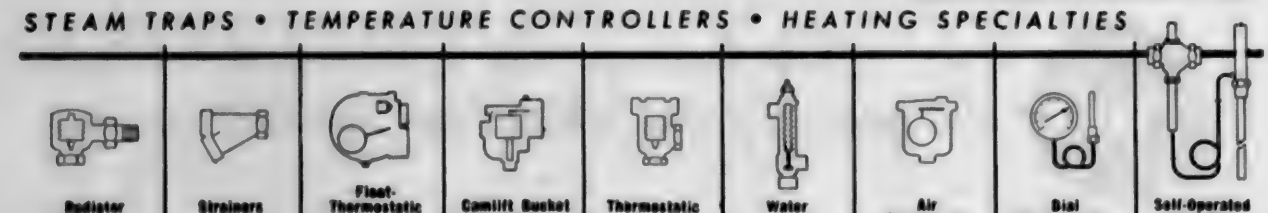
SARCO

Sarco quality assures satisfaction

HERE ARE THE 21 BUCHART-DESIGNED PENNSYLVANIA SCHOOLS RELYING ON SARCO HEATING SPECIALTIES

- Kennard-Dale Junior-Senior High School
- Susquehannock Junior-Senior High School
- York Township Elementary School
- Red Lion High School
- Spring Grove Elementary School
- Dover Joint Elementary School
- Southampton Township Elementary School
- Quarryville Boro Elementary School
- Springettsbury Township Elementary School
- Spring Grove Joint High School
- Jefferson Elementary School
- McConnellsburg-Ayr-Todd Elementary School
- Union-East Buffalo Elementary School
- Pequea Township Elementary School
- Mt. Rose Junior-Senior High School
- Kennard-Dale Junior-Senior High School Addition
- Stewartstown Elementary School Addition
- Windsor Township Elementary School
- Jackson Township Elementary School
- New Salem Elementary Center
- Springettsbury Independent Elementary School Addition

STEAM TRAPS • TEMPERATURE CONTROLLERS • HEATING SPECIALTIES



THE ONLY Matched

COOLING TOWERS and CONDENSERS

The Halstead & Mitchell Cooling Towers you select are *matched* by design to work with the famous Halstead & Mitchell water-cooled Condensers. You need no longer buy a high-efficiency cooling tower to work with a low-efficiency condenser (or *vice-versa)* . . . a long-life cooling tower to work with a short-life condenser (or *vice-versa).*

Remember that every cooling tower you sell is planned to work with a water-cooled condenser—then you'll see why America's leading manufacturers of air-conditioning and refrigeration equipment have swung to Halstead & Mitchell for their original equipment needs in both these components.

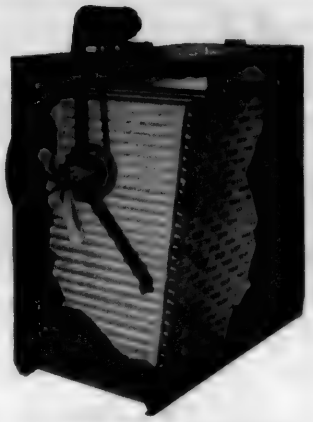
With cleanability you'll sell more. Why sell less?

20-Year Guarantee!

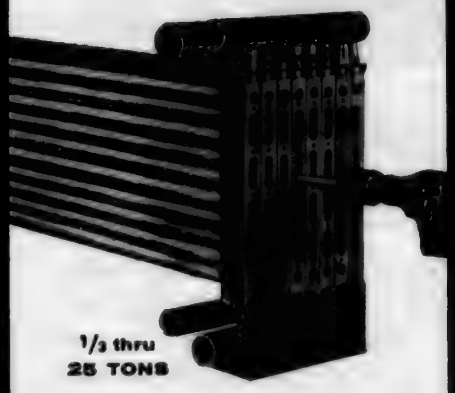
on the wetted deck surface against rotting or fungus attack

Only Halstead & Mitchell pressure-creosoting can provide a *guarantee* against immediate attack by fungus and marine parasites . . . or chemical deterioration from acids in water.

Added to this H&M exclusive are other major advantages. There's ultra-high efficiency in the gravity-type water distributing pan which eliminates extra pumping head required on spray type towers . . . and cuts down on water losses due to "atomizing" of water. And there's extra-long life in stainless steel fans . . . and sheet steel cabinets hydraulically painted with vinsynite, vinyl zinc and chlorinated rubber.



2 thru 120 TONS



1/3 thru 25 TONS

Lifetime Cleanability

The *mechanical* cleaning of H&M double-tube, counter-flow condensers means the simplest, least dangerous method of restoring new unit efficiency. Whether removing a heavy coating of sludge and scale, or a thin insulating film on the inner walls of the copper tubing, the mechanical cleaning tool restores heat transfer efficiency in a matter of minutes. The result is lowered discharge pressures . . . more heat carried off by cooling water . . . lower bills. *Only* the impurities are removed . . . the thickness of the copper wall remains intact, and the condenser gives extra years of peak service.

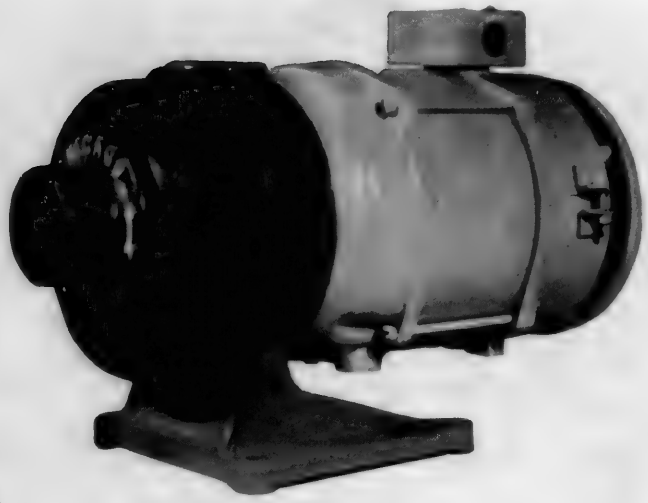
At Leading Heating and Refrigeration Wholesalers EVERYWHERE

Write for Detailed Specifications

Halstead & Mitchell

BESSEMER BUILDING • PITTSBURGH 22, PA.

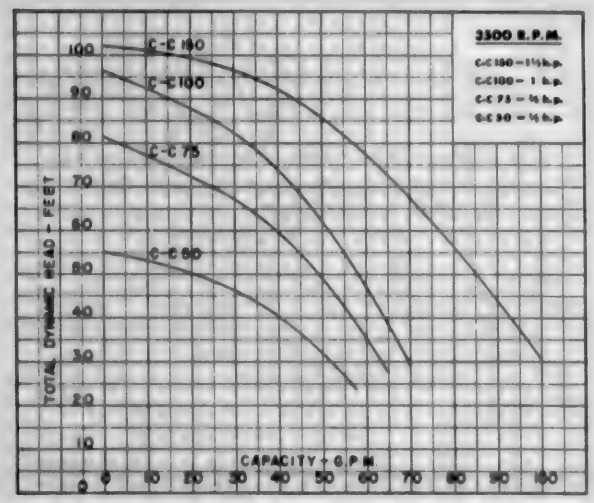
CC CLOSE-COUPLED PUMPS*



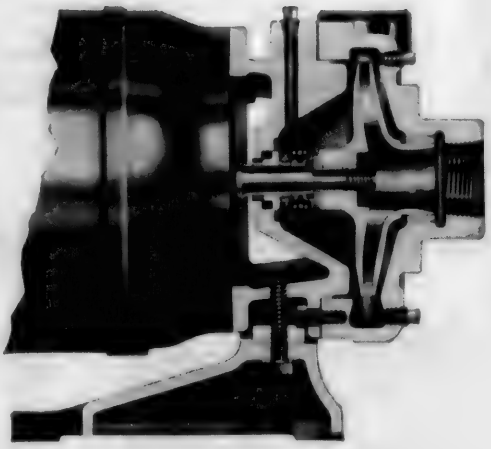
All Pumps in stock
Shipped same day order received

TYPICAL C-C SERIES PUMP APPLICATIONS ARE:

Cooling Towers • Air Conditioning
Chilled Water Circulating
Hot Water Circulating
Pneumatic Water Systems
Booster Systems



*For cooling towers, etc.



C-C Series pumps are equipped with a Leak-Proof "Chicago Mechanical Seal". Each pump operates over the entire range of its curve quietly and smoothly without motor overload. Write to Department B for Bulletin 108-G.

CHICAGO PUMP COMPANY

Subsidiary of Food Machinery and Chemical Corporation

BUILDING and INDUSTRIAL DIVISION

622 DIVERSEY PARKWAY • CHICAGO 14, ILLINOIS

fmc

Condo-Vac, Sure Return, AVC, LVC, Fire, House & Circulating Pumps Pneumatic & Tankless Water Systems.

Flush-Kleen Sewage Ejectors Little Giant & Non-Clog Bilge Pumps Pumps for every industrial use

Your air conditioning problem can be a "breeze"—

THE BETTMANN ARCHIVE

How's this old-time gadget for air conditioning service! If you need advice on your clients' air conditioning problems, you can get specialized assistance from Airtemp.

Let AIRTEMP help you!

Airtemp can guide you in planning your commercial and industrial air conditioning

You Get Guidance of Top Engineers
Your needs get individual attention. Airtemp Construction Corporation, subsidiary of Chrysler Corporation, brings you the advisory service of engineering specialists.

You Choose from a Full Line of Equipment
You can select your individual system from the complete Airtemp line. Airtemp offers *every* type of modern, precision-built air conditioning equipment—conventional or specially-engineered—for a room or a building.

You Have the Prestige of a Leader
The Chrysler name brings you tremendous public acceptance. Airtemp's reputation is built on 18 years of experience and leadership in air conditioning *exclusively*.

You Get Finest Service through the Years
You can depend on local Airtemp service in the years to come. Trained personnel and facilities throughout the nation guarantee satisfaction

All at a Low Cost That Will Surprise You
You save money on Airtemp's low installation costs, low operating costs. Extra economy like this results from Airtemp's efficient design and operation.

AIRTEMP SERVES ALL AMERICA

SOUTHWEST AMERICAN PUBLISHING COMPANY, Ft. Smith, Arkansas. Contractor: Harry G. Barr Company.

STUART INVESTMENT BUILDING, Lincoln, Nebraska. Contractor: Sidles Company. Built in 1937.

WAVERLY GROWERS CO-OPERATIVE, Waverly, Florida. Contractor: H. N. Webster, Sebring, Florida. Built in 1947.

Write for Full Information

For complete details on how Airtemp can be of service to you, write to:
Airtemp Division, Chrysler Corporation,
Dept. ACHV-5-55, Dayton 1, Ohio.

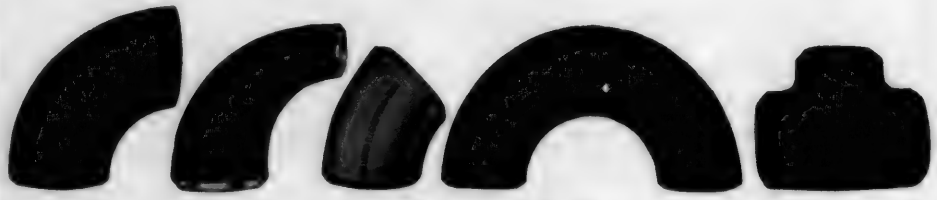
Airtemp
DIVISION OF CHRYSLER

AIRTEMP Comfort Zone

AIR CONDITIONING • HEATING FOR HOMES, BUSINESS AND INDUSTRY

Depend on LADISH

- Carbon Steels
- Carbon-Molybdenum Steels
- Chromium-Molybdenum Steels
- Nickel Steels
- Chromium-Nickel Steels
- Chromium-Silicon-Molybdenum
- Wrought Iron
- Chromium Type Stainless
- Chromium-Nickel Stainless
- Molybdenum Type Stainless
- Wrought Aluminum
- Aluminum-Copper Alloys

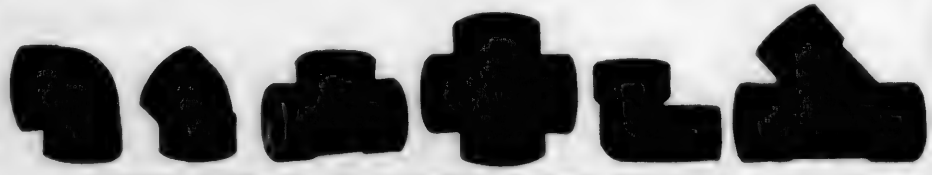


BUTT WELDING FITTINGS

½ inch through 42 inches . . .

FORGED CORROSION RESISTANT—LIGHT WEIGHT and A.S.A. FLANGES

½ inch through 24 inches . . .



FORGED SCREWED OR SOCKET WELDING FITTINGS and UNIONS

⅛ inch through 4 inches . . .

LARGE DIAMETER AND T.E.M.A.* STANDARD FLANGES up to 20 feet O.D.

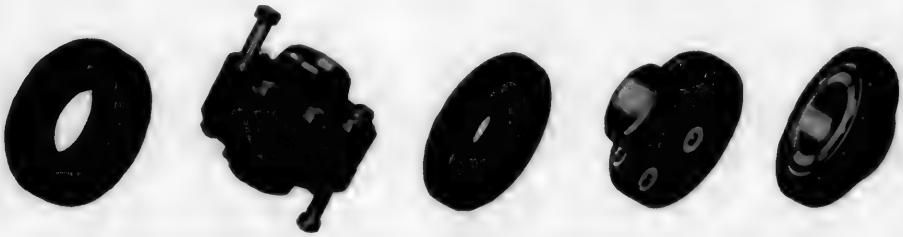
*Tubular Exchanger Manufacturers Association

LONG WELDING NECKS up to 24 inches, 150 lb. through 2500 lb.

Complete Service . . .

BUTT WELDING FITTINGS

Schedules 5S, 10S, 40S, 80S, and other Schedules and wall thickness.



FORGED CORROSION RESISTANT—LIGHT WEIGHT and A.S.A. FLANGES

150 lb. through 2500 lb. pressure ratings.

FORGED SCREWED OR SOCKET WELDING FITTINGS and UNIONS

150 lb. Corrosion Resistant and 2000 lb. through 6000 lb. ratings.

FOR FITTINGS FROM ANY FORGEABLE MATERIAL TO MEET YOUR SERVICE REQUIREMENTS

You get prompt, efficient service when you specify and order from the complete Ladish Controlled Quality line. Fittings *in any forgeable material* in virtually every type, size, wall thickness or pressure rating . . . are produced to one uncompromising Controlled Quality standard . . . and identified with heat code symbols pioneered by Ladish as verification of metallurgical integrity resulting from exhaustive tests made in the Ladish metallurgical laboratories.

For *complete service* on your fittings requirements, depend on the Ladish line and the services of your Authorized Ladish Distributor.

THE COMPLETE *Controlled Quality* FITTINGS LINE

LADISH CO.

CUDAHY, WISCONSIN

MILWAUKEE SUBURB

District Offices: New York • Buffalo • Pittsburgh • Philadelphia • Cleveland
Chicago • St. Paul • St. Louis • Atlanta • Houston • Odessa • Tulsa
Los Angeles • San Francisco • Seattle • Havana • Mexico City • Brantford, Ont

L

TO MARK PROGRESS

- Aluminum-Manganese Alloys
- Deoxidized Copper
- Hastelloy
- Titanium
- Forging Brass
- Everdur Bronze
- Silicon Bronze
- Manganese Bronze
- Wrought Nickel
- Nickel-Copper Alloys
- Inconel
- Monel

How to Select an Economical Temperature Regulator

First of all, what does economy mean where temperature regulators are concerned? In some industries it means improvement of product or reduction of spoilage through closer control of process temperatures. In others, it means the paring down of operating expense. The price of the regulator itself is a relatively small factor.

Today's buyers are shopping for:

1. Accuracy of control — not only when the regulator is new, but throughout its service life
2. Dependability — to prevent loss of production time
3. Minimum installation and maintenance cost

Here are a few tips on what to look for when you're installing a new or replacing an old temperature regulator —

Packless construction . . . and for this reason: A diaphragm operated, packless regulator minimizes friction. There are no closely fitted parts to stick or bind because of uneven expansion or collection of foreign matter. Also, there's less maintenance, since no repacking is ever required.

A guarantee against wire drawing of the seats and discs. Insist on it. This guarantee in combination with single seat design assures you of tight shutoff; you avoid expensive steam losses as well as loss of product in a process application.

Broad control range. In a standard regulator you should expect a control range of 100 F. And make sure the unit you select has a vapor tension thermostat that can take over-temperatures of at least 100 F.

Easy maintenance. Why ask for grief? Your temperature regulator should be basically simple in design so that it can be serviced by average plant personnel. All parts should be readily accessible for testing and cleaning.

Double duty. There's no point in buying a separate pressure regulator when you can select a temperature regulator that combines both temperature and pressure control within the same unit.

Self-operating. Make sure you get a regulator that operates on its own initial pressure. By doing so, you avoid the purchasing and maintenance of an air compressor plus air piping, and you're sure of uninterrupted operation during electric power failures.

• • • •

All of these points are important to you when it comes to selecting an economical temperature regulator. Perhaps you didn't realize you *could* expect so much. And perhaps you didn't realize that Spence Temperature Regulators offer all these features and more. May we send you our Bulletin T 500 containing further details? SE 150

SPENCE ENGINEERING COMPANY, INC.
Walden, New York

UNITS LIKE THESE...

BRING SAVINGS LIKE THESE...

* **In a New York skyscraper, Dorex Air Recovery eliminated the need for two large ducts up through 39 floors—saving valuable space as well as installation costs.**
* **In a Pittsburgh building, Dorex Air Recovery cut required air intake in half—saving some $47,000 on original equipment.**
* **In Chicago, a large industrial plant found Dorex Air Recovery so reduced required boiler capacity that over $40,000 was saved.**

BEST WAY to build your air conditioning and ventilating reputation is to offer a better installation that will save your customers money. You can do this by making Dorex Air Recovery part of your systems. The savings shown above are typical.

Dorex Air Recovery utilizes activated carbon to "manufacture" fresh air. Thus, intake of outside air can be reduced by as much as two-thirds—with corresponding savings in heating and cooling capacity.

Let us show you how Dorex can help improve your air conditioning and ventilating layouts. Write today for complete information. No obligation, of course. Connor Engineering Corp., Dept. B-55, Danbury, Conn.

CONNOR

dorex®

air recovery

PAUL THIRY'S *daring, functional design called for modern*

SARCOTHERM HEATING CONTROLS

Architect: Paul Thiry
Engineers: The Austin Company
Heating Contractors: L. S. Massert Plumbing & Heating Co.

CHURCH OF CHRIST THE KING, SEATTLE, WASH. Semi-circular arrangement seats 550 persons with no pew more than 50 feet from altar. Other features: 60-foot carillon tower; covered portico, stained glass clerestory.

TAKE ADVANTAGE OF SARCOTHERM'S UNUSUAL ENGINEERING SERVICE

In A Class By Itself—Sarcotherm's engineering service begins with the inception of the job, *carries through* every step of the way.

Complete Installation Drawings And Wiring Diagrams—not just general drawings but complete, tailor-made drawings and diagrams for each individual job.

On The Job Help—your contractor gets full cooperation and technical assistance backed by many years of specialized experience.

ARCHITECT PAUL THIRY'S inspiring design for Church of Christ The King is completely functional from its 60-foot carillon tower down to its weather modulated controls.

Radiant heating and the large attendance expected necessitated an extremely accurate, sensitive control system. To do the job, design engineers specified a Sarcotherm Weather Compensated Control System which insures comfort conditions inside regardless of outside temperatures.

Sarcotherm advantages of simple, low-cost, accurate control plus unique engineering service can help you design and install the most efficient system possible. A Sarcotherm engineer will be happy to advise you on your next project.

For full information on Sarcotherm controls, write for complete catalog.

SARCOTHERM CONTROLS, Inc.
Empire State Bldg., New York 1, N. Y.
An Affiliate of SARCO COMPANY, INC.

Weather Modulated Controls for **HOT WATER, RADIANT AND STEAM** *Heating Systems*

BENDS EASY!

CHASE® soft temper Copper Water Tube makes a neater, faster radiant heating job!

You can save time and *still* do a quality radiant heating job...with Chase Copper Water Tube. Its soft temper means it can be bent *by hand*. Its long 60 and 100 foot lengths mean you make fewer joints. Both of these features mean a faster, neater installation.

Lightweight Chase Copper Water Tube is easy to handle, easy to install. It can be joined quickly with leak-proof Chase Solder-Joint Fittings, using standard soldering techniques. Result—a radiant heating system that stays pressure-tight *for good!*

Chase Copper Water Tube and Chase Solder-Joint Fittings are available in all sizes from your Chase Wholesaler. Call him today.

Chase®

BRASS & COPPER CO.

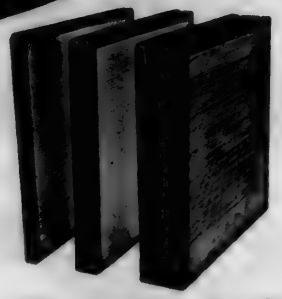
WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

Chase Copper adds extra value to any home!

The Nation's Headquarters for Brass & Copper

Albany† Atlanta Baltimore Boston Charlotte† Chicago Cincinnati Cleveland Dallas Denver Detroit Grand Rapids† Houston Indianapolis Kansas City, Mo. Los Angeles Milwaukee Minneapolis Newark New Orleans New York Philadelphia Pittsburgh Providence Rochester† St. Louis San Francisco Seattle Waterbury (†sales offices only)

THE MEASURE OF A GOOD AIR FILTER



1", 2" or 4" thick?

Whether you need filters for package air conditioners or furnaces, for general filtration or for special applications requiring the highest efficiency and greatest dirt capacity, Farr Company has a standard type to fit the job — available in steel, aluminum, copper, stainless and monel.

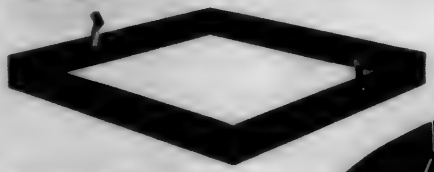
How much media?

In FAR-AIR® filters you get more media per square inch *plus* the famous herringbone-crimp design that assures greater dirt holding capacity and lower pressure loss. Firmly packed media provides even density and assures uniform high efficiency over the entire filter area.

FARR COMPANY
NO COMPROMISE ON QUALITY
Los Angeles, New York, Chicago, Memphis

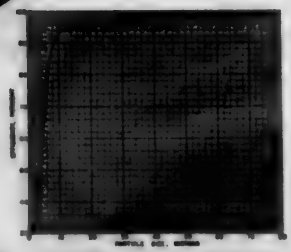
®Trade Mark

What kind of construction?



Heavy gauge filter frames and interlocking holding frames assure rigid filter banks and proper fit. Reinforcing rods drilled through the filter media make the filter more rugged. *Engineered* quality assures longer service life.

How efficient?



High efficiency in a filter is its only real reason for existence. FAR-AIR® filters consistently deliver superior performance. Send for your set of efficiency curves which show how the various types of FAR-AIR® filters will perform for you.

FARR COMPANY
P. O. Box 45187, Airport Station
Los Angeles 45, California

☐ Send efficiency curves
☐ Send a Farr Field Engineer

Name_____ Title_____

Company_____

Address_____

• Some of the 189 YARWAY Gun-Pakt expansion joints installed at large oil refinery in Texas.

No fatigue with 189 YARWAY GUN-PAKT EXPANSION JOINTS at this large Texas refinery

THEY just work and work for years and never get tired. Yarway Gun-Pakt slip-type joints simply will not fail through fatigue. They will operate smoothly, as frequently as required, over long, full traverse up to 12" single type or 24" double type or short, partial traverse, day in and day out—with never any danger of metal fatigue or failure.

This is just one of the many big advantages found in Yarway Gun-Pakt expansion joints. Other outstanding Gun-Pakt features are:

1. Can be serviced under *full* steam pressure day and night, thus avoiding costly and inconvenient shutdowns.
2. Fixed Gun-Pakt gland serves as "built in" external guide and permits less costly and rigid pipe guidance than required by many other types of joints.
3. Lower pressure load on end anchors because excessive strains are eliminated.

Used for many years with success in well-known refineries, industrial plants, utilities and institutions. When replacing present joints or planning new steam lines, it will pay you to look into the advantages of the Yarway Gun-Pakt expansion joint. Write for Yarway Bulletin EJ-1913.

YARNALL-WARING COMPANY
104 Mermaid Avenue, Phila. 18, Pa.
BRANCH OFFICES IN PRINCIPAL CITIES

YARWAY

gun-pakt expansion joints

Shown here are air ducts, 58" x 66" and 38" x 38", of the Atlantic City Convention Hall, which are insulated with aluminum-foil-faced Super·Fine. This job was handled by the Triangle Insulation Company, Inc., of Philadelphia, Pa.

L·O·F Glass Fibers Super·Fine can reduce installation costs 30%

When you're after an air-conditioning contract, a big saving in insulation cost can be mighty important.

Provided, of course, your insulation material is as good or better than that offered by competition.

Here's a case in point: The Triangle Insulation Co., Inc., installed the insulation on the new air-conditioning system at the Atlantic City Convention Hall. The job involved approximately 16,000 square feet of duct insulation.

The specifying engineer realized that L·O·F foil-faced Super·Fine offered high efficiency in insulation material together with a vapor barrier. *Most important, ¾-pound density Super·Fine could be installed at a 30% saving compared to other methods and materials.*

Here's why installation costs less:—Super·Fine is pliable and will conform to irregular contours. Easy to handle and apply, there's no shaping or fitting with Super·Fine.

Super·Fine's fine glass fibers will not burn or absorb moisture, will not rot or mildew. It is verminproof and rodentproof.

FREE! For helpful folder giving instruction in installation, write: L-O-F Glass Fibers Company, Dept. 63-55, 1810 Madison Avenue, Toledo 1, O.

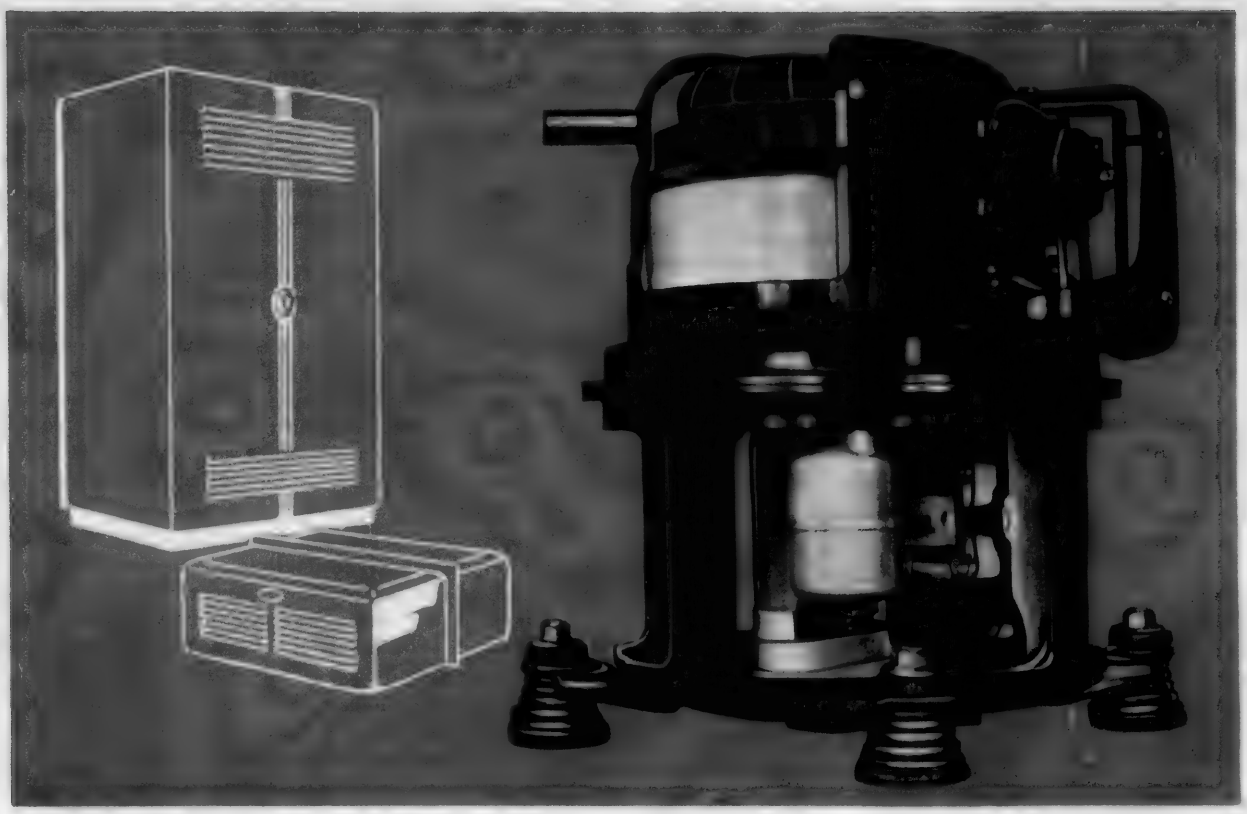
L·O·F GLASS FIBERS

L·O·F GLASS FIBERS COMPANY

Makers of glass fibers by the exclusive "Electronic-Extrusion" process

WHISPER-QUIET **POWER**

for package Air Conditioning



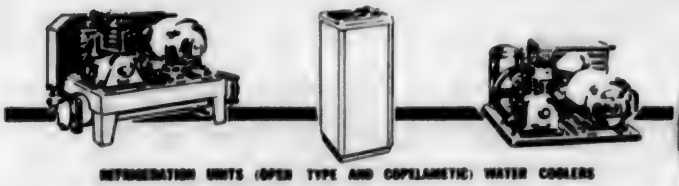
COPELAWELD *HERMETIC*

It takes real engineering (and knowledge of your customers' needs) to produce a welded motor-compressor that combines positive performance, vibration-free smoothness, and maximum operating economy.

Copeland gives you these design advantages and more . . . plus precision manufacture using finest components. Heavy-duty, high-power-factor motor delivers power aplenty with minimum current consumption. Freon-12 and Freon-22 models available. Use of Freon-12 can give you as much as 75°F. lower temperatures in windings, crankcase, oil and discharge side. Unusually high capacities make Copelaweld motor-compressors adaptable to virtually every type of duty.

Power all your air conditioning and refrigeration equipment with Copeland motor-compressors. It's *the* quality equipment that enhances your reputation by its long-run, trouble-free service.

Get full details . . . write today for complete information on the profit-making Copeland line.



REFRIGERATION UNITS (OPEN TYPE AND COPELAMETIC) WATER COOLERS

Copeland

DEPENDABLE REFRIGERATION

COPELAND REFRIGERATION CORPORATION · SIDNEY, OHIO

Random Thoughts from a Filter Engineer

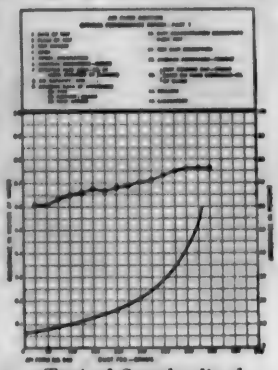
by J. K. Brixius

- **HOW TO COMPARE FILTERS**
- **WE FAVOR THE LIGHT APPROACH**
- **RULE OF THUMB FOR CATCHING DUST**

HOW TO COMPARE FILTERS

If you're like most of us, you always compare one car with another before you buy. But have you ever tried to compare two filters? Most prospective buyers can't evaluate the filters themselves. They have to depend on what each manufacturer says about his filter. That means comparing the results of each manufacturer's filter tests. There's the rub! No two manufacturers run tests under the same conditions. Or with the same test dust. Trying to compare filter test data is like trying to compare apples and oranges. It can't be done.

Manufacturers could easily simplify the customer's problem if they only would. They could do it by running tests with the same test dust, under the same conditions. We at Air-Maze use the standardized test dust and testing equipment developed by the Air Filter Institute. And for electrostatic precipitators, the National Bureau of Standards Discoloration Method, using outside atmospheric dust.



Typical Standardized AFI Test Form

We have just adopted this procedure and hope other companies will join us in these standardized tests. Then comparison *will* be possible.

WE FAVOR THE LIGHT APPROACH

Just the other day we were reading about the millions of dollars aircraft manufacturers spend trying to shave a few pounds off their latest jet. And we thought that airplane manufacturers aren't the only ones fighting against excessive weight. Filter makers are in pretty much the same boat.

We try to make the lightest possible filter that will be strong enough to do its job. A light filter is easier to handle, less likely to be damaged and cheaper to ship. And, we've found from experience, it's usually easier and therefore less costly to handle or service. This adds up to big customer savings, especially in the larger banks of filters.

An example of the Air-Maze light approach: Our P-5 high velocity filter has a stamped 22 gauge cold rolled steel enclosing channel. The channel overlaps at corners which are welded with "shielded-arc" using helium. Both sides of the panel have expanded steel facing tied together to bond the media and channel into a rigid structural unit. Result: As strong as filters with heavier frames, yet weighs less. And the savings are passed on to you!

RULE OF THUMB FOR CATCHING DUST

The problem of what type of filter to use under any given dust condition has puzzled users for many years. Even today, adequate data is lacking to make selection easy. However, we present the chart below as a rough guide, fully realizing that our divisions are arbitrary and may be subject to criticism. We'd be glad to furnish anyone interested with extra copies.

Of course, as most everyone knows, the ability to collect dust down to any given particle size is not the whole story in filter selection. Such very important factors as dirt holding capacity, resistance to air flow, cost, maintenance, and ability to withstand temperature, humidity, and even high altitude conditions, must be considered.

That is why we suggest you let us help you with your air filter selection. Since we make almost every known type, we have no reason except your best interests to consider when making recommendations.

The Air-Maze Corporation, 25000 Miles Road, Cleveland 28, Ohio.

VENTILATION AIR FILTER SPECTRUM

THIS CHART INDICATES THE TYPE OF FILTER GENERALLY USED AND BEST SUITED TO REMOVE VARIOUS ATMOSPHERIC IMPURITY PARTICLE SIZES

PARTICLE SIZE IN MICRONS — 1000 | 10 | 1 | 1/10 | 1/100

TYPE OF FILTER	VISCOUS IMPINGEMENT	DRY AIR FILTER	ELECTRONIC AIR CLEANER (ELECTROSTATIC PRECIPITATOR)	ULTRA FILTER (USED AS CHILE PAPER OF CHEMICAL CORP. AND ATOMIC ENERGY COM.)
RATING TEST	RATED BY WEIGHT OF STANDARD DUST PASSING FILTER WITH AIR FILTER INSTITUTE METHOD	RATED BY WEIGHT OF STANDARD DUST PASSING FILTER WITH AIR FILTER INSTITUTE METHOD	RATED BY DISCOLORATION OF TEST PAPER WITH BUREAU OF STANDARDS TEST METHOD	RATED BY DOP (DIOCTYLPHTHALATE) SMOKE PENETROMETER WITH CHEMICAL CORP METHOD
GENERAL SERVICE	USED TO REMOVE NUISANCE TYPE DUST	USED TO REMOVE SMALLER PARTICLES	USED TO REMOVE LARGE PERCENTAGE OF FINE PARTICLES AND SMOKES	USED FOR HIGHEST EFFICIENCY ON SMALL HEALTH HAZARD PARTICLES
COMMENTS	MOST COMMONLY USED—CHEAPEST PER CFM—EASIEST TO MAINTAIN REDUCES BUT DOES NOT ELIMINATE HOUSECLEANING	COMMONLY USED WHERE EFFICIENCY OF ENCLOSURE DO NOT STOP ENOUGH SMALL PARTICLES ORIGINAL COST MAIN TENANCE COST FOR REASONABLE DIRT CAPACITY IS HIGH	COMMONLY USED WHERE HOUSECLEANING MUST BE REDUCED TO A MINIMUM OR HIGH GRADE PROCESS PROTECTION IS REQUIRED GENERALLY USED WITH VISCOUS IMPINGEMENT	OTHER TYPES USED AS PREFILTERS TO REDUCE MAINTENANCE

AIR-MAZE

The Filter Engineers

AIR FILTERS • SILENCERS • SPARK ARRESTERS
LIQUID FILTERS • OIL SEPARATORS • GREASE FILTERS

DON'T OVERLOOK JOBS THE AXIAL FLOW DOES BEST!

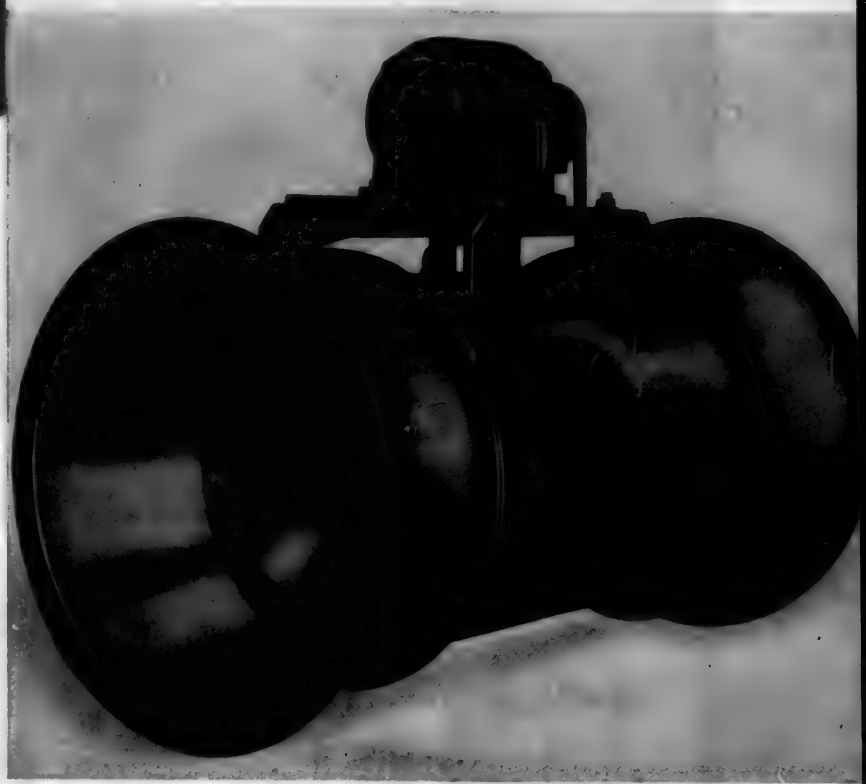
The axial flow fan design offers distinct advantages well worth considering for a growing variety of jobs:

1. STRAIGHT LINE EFFICIENCY. Being basically designed for duct mounting, the axial flow is at its best when mounted in straight duct runs. "Buffalo" Axial Flows are giving excellent service as duct-mounted "boosters" in systems—also as light-duty ventilation, exhaust and industrial air conditioning supply fans.

2. LIGHT WEIGHT. This permits economical installation. In all but the very largest sizes, no heavy foundations or structural support are required. "Buffalo" Axial Flow Fans are often installed as part of the pipe or stack in hood and vat or other roof exhaust systems.

3. SPACE SAVINGS. These duct-size fans fit in close to walls or ceilings. Space-saving applications vary from paint spray booth exhaust to forced draft for cooling towers — from circulation of chilled air in quick freezing to boiler room cooling. Here, high efficiency influences the choice, as well as compact size.

Naturally, all axial flow fans are not alike. When you specify "Buffalo", you assure your customer the top performance inherent in the "Q" Factor*. Write today for Bulletin 3533-EF for full details.



Right, "Buffalo" Type "B" Vaneaxial Fan. Outlet guide vanes smooth out air flow for greatest efficiency and quiet operation. Available for high or low temperatures, corrosive fumes, explosive atmospheres, etc.

NOTE: No one fan is the answer to every problem. "Buffalo" builds all types, including broad lines of centrifugal and propeller fans. Full details on request.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life*

"Buffalo"

BUFFALO FORGE COMPANY

480 BROADWAY BUFFALO, N.Y.

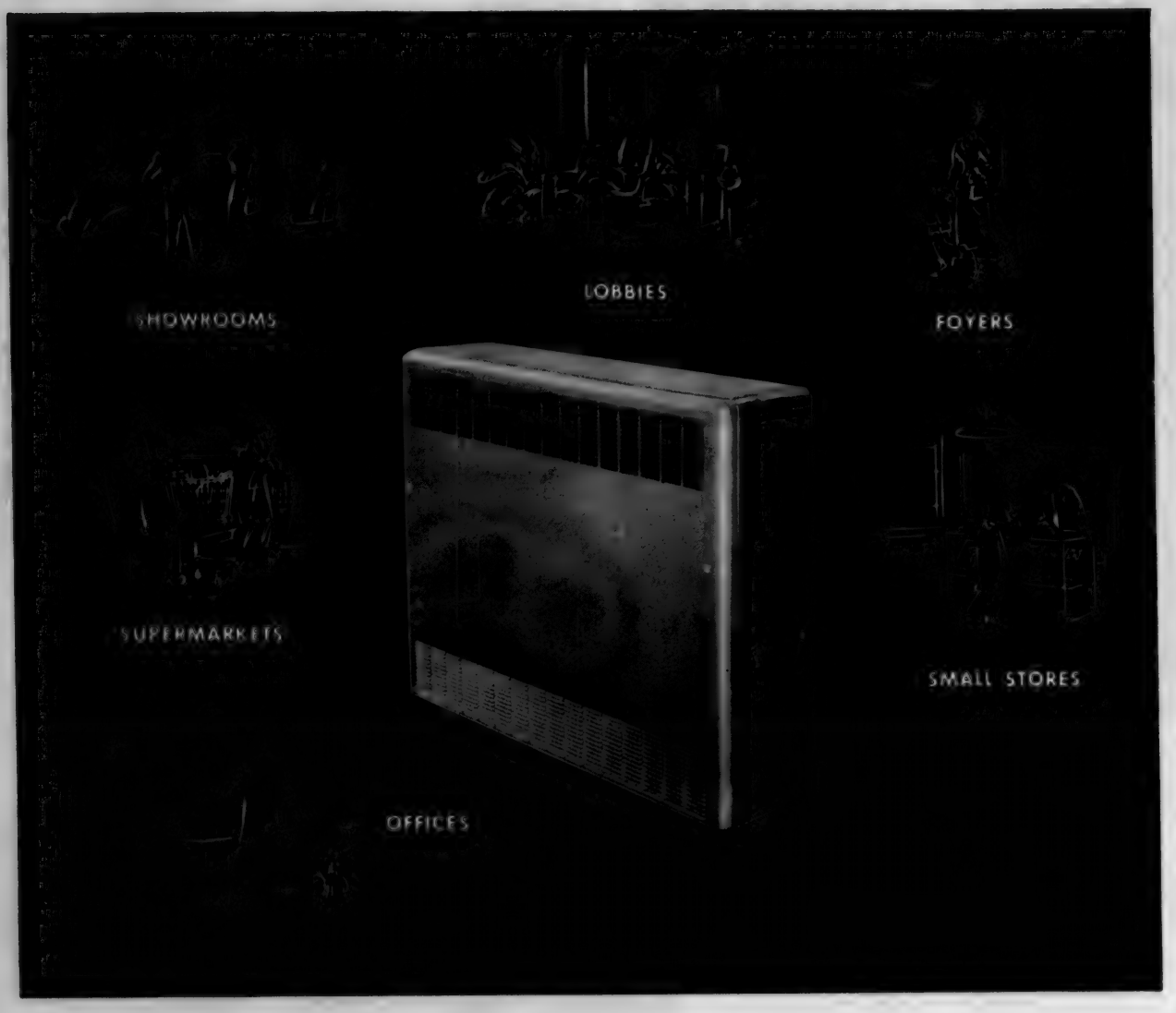
PUBLISHERS OF "FAN ENGINEERING" HANDBOOK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

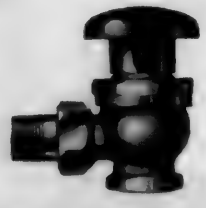
Sales Representatives In All Principal Cities

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

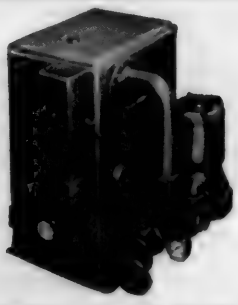
Announcing New DUNHAM Cabinet



From radiator traps
to fully engineered systems
you can DEPEND ON DUNHAM for
everything you need in heating



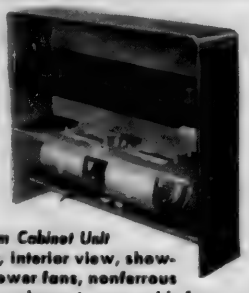
Dunham Radiator Valves. Complete line of radiator valves, traps and other specialties for steam heating.



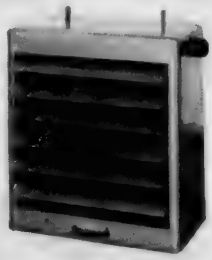
Dunham Vacuum Heating Pumps. Single and Duplex models. No close clearance parts. Only one moving element.

Heaters with the Convector look...

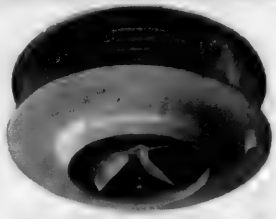
unit heater capacity



Dunham Cabinet Unit Heater, interior view, showing blower fans, nonferrous heating element, removable fan assembly, filter.



Dunham Horizontal Discharge Unit Heater, for steam or hot water, capacities from 10,600 to 360,000 BTU.



Dunham Vertical Discharge Unit Heater, for steam or hot water, capacities from 26,000 to 576,000 BTU.

These new Dunham Cabinet Heaters combine the attractive looks of a convector with the high heating capacity of a unit heater. Moderate in price, they're a sure-fire solution to the problem of heating lobbies, foyers, showrooms, supermarkets, small stores and offices.

Easy to Install in floor-mounted, vertically wall-mounted, recessed or concealed positions. Seven different styles. Keyhole slots punched through back of cabinet assure rapid mounting. Front cover secured by just two screws on most models. Knockouts provided for all connections.

Quiet Operation. Two-speed motor mounted in rubber. Lightweight, balanced blower fan wheels, large heating element area for low air velocities. Replaceable filter.

Less Maintenance. 16-gage steel cabinet fronts—20-gage tops, ends, backs. Blower wheels directly mounted on double-end shaft motor completely eliminates external bearing, pulley and all belt troubles.

For industrial and other large space-heating applications, Dunham offers a complete line of propeller fan unit heaters—both horizontal and vertical types—in a broad range of sizes

For full information, write for Bulletin ACHV-5, C. A. Dunham Company, 400 W. Madison Street, Chicago 6, Illinois.

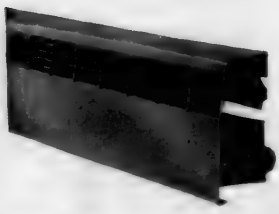
DUNHAM

HEATING & COOLING EQUIPMENT

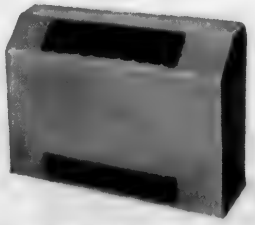
RADIATION • CONTROLS • UNIT HEATERS • PUMPS • SPECIALTIES

Quality First for Over Fifty Years

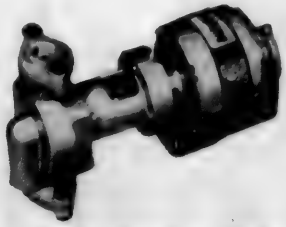
C. A. DUNHAM COMPANY • CHICAGO • TORONTO • LONDON



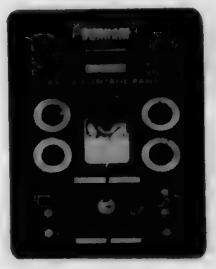
Dunham Radiation. Full range of sizes and types of convectors, baseboard and finned tube radiation.



Dunham Unit Heaters. Line includes heating-cooling units, vertical, horizontal discharge and large blower unit heaters.



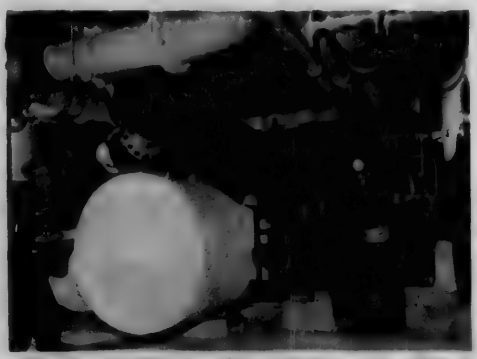
Dunham Circulators. Heart of Dunham's complete hot water line. Single-spring motor coupling. Brand-name motor.



Dunham Vari-Vac®. Precision temperature control system uses continuous-flow "cool" steam, cuts fuel costs up to 40%.

WORTHINGTON AIR CONDITIONING SYSTEM in New York's East Side airline terminal . . .

. . . cools 12,000 airline passengers a day



CHILLED WATER to air condition new airline terminal is supplied by this efficient Worthington centrifugal refrigeration unit.

Passengers stay cool and comfortable in New York City's new East Side Airline Terminal while waiting for their trip to the airports.

A joint enterprise serving 21 U. S. and foreign flag airlines, the new terminal accommodates over 12,000 people a day.

And for this modern building, nothing less than a truly modern air conditioning system would do. That's where Worthington came in. A Worthington-engineered, Worthington-built 315-ton centrifugal refrigeration system, along with Worthington air handling equipment and pumps, carries the entire cooling load for the terminal's 3,300,000 cubic feet of space.

Worthington air conditioning equipment has been the choice of leaders in business and industry for over 50 years. For the reasons why, write Worthington Corporation, Air Conditioning and Refrigeration Division, Section A.5.36 –V, Harrison, New Jersey.

A.5.36

"SEE the Worthington Corporation Exhibit in New York City. A lively, informative display of product developments for industry, business and the home. Park Avenue and 41st Street."

WORTHINGTON

CLIMATE ENGINEERS TO INDUSTRY, BUSINESS AND THE HOME

You Gave Us The Cue

...and CONTINENTAL
came through
for you
with

A SUPERIOR AUTOMATIC SELF-CLEANING AIR FILTER

which provides "Ferris-Wheel action" and four-star performance:

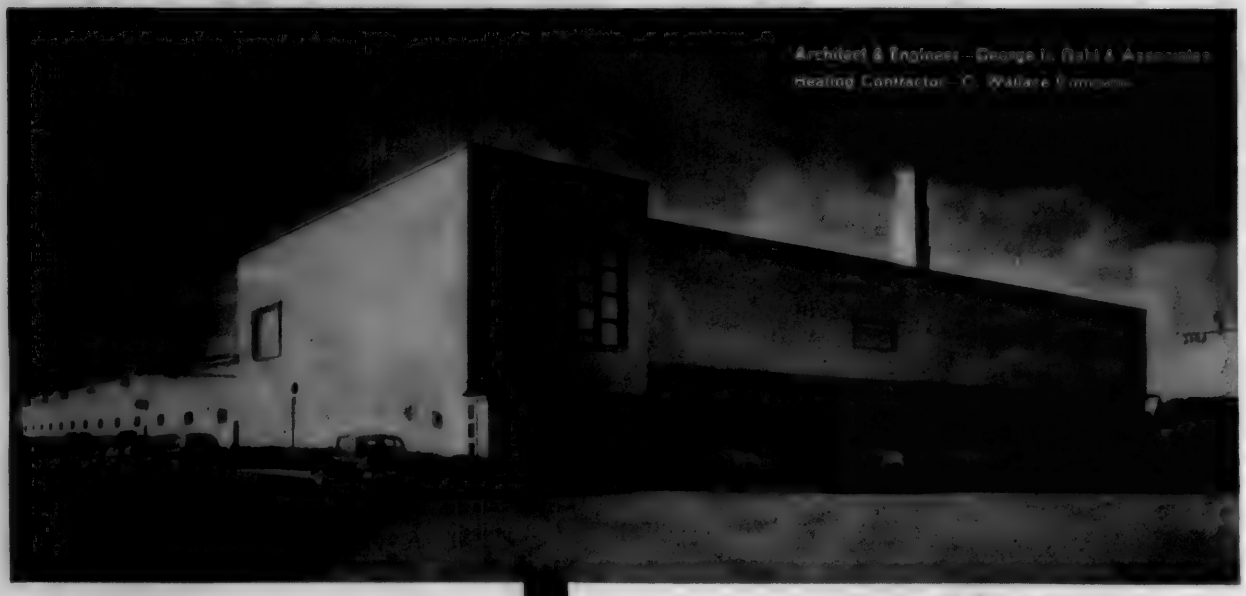
- **high efficiency**
- **low resistance**
- **non-clogging**
- **positive cleaning**

Step right up and ask for your free copy of Continental's all-new 12-page, fact-filled Bulletin No. 210—all about automatic air filtering.

P.O. BOX 1647 LOUISVILLE 1, KY.

CONTINENTAL
AIR FILTERS Inc.

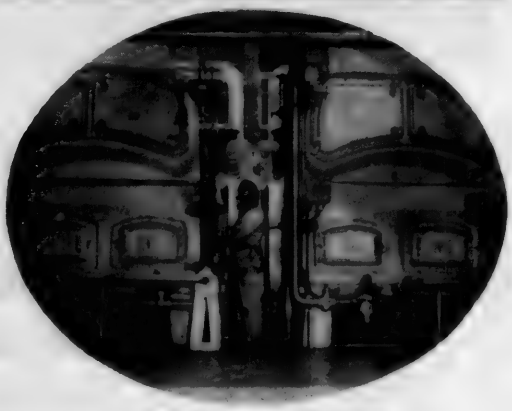
HOW "RESERVE STEAM" HELPS MRS. BAIRD'S BREAD CO. KEEP PACE WITH GROWING MARKETS



KEWANEE reserve plus rated

. . . BOILERS PROVIDE FOR FLUCTUATING LOADS AND FUTURE EXPANSION

It's "full steam ahead" for growth at Mrs. Baird's Bread Co., Dallas, Texas. That's because management looked well into the future in planning the company's modern plant. Take the boilers as an example. Past experience proved that boilers with reserve capacity could economically provide sufficient power to meet the needs of expansion. Kewanee Reserve Plus Rated Boilers were installed, with 50% extra power built in for additional capacity requirements. When fluctuating loads demand more steam at once . . . it's there with Kewanee. When expansion calls for more steam . . . it's there with Kewanee. So, when you consider boilers, don't be misled by promises that a boiler delivers enough steam to meet average daily requirements. Look for reserve to assure performance beyond the call of usual duty. Consider Kewanee Boilers, rated on nominal capacity to operate at "cruising speed". You'll get greater efficiency at lower cost, plus longer boiler life. Only a boiler rated on nominal capacity can make that guarantee.



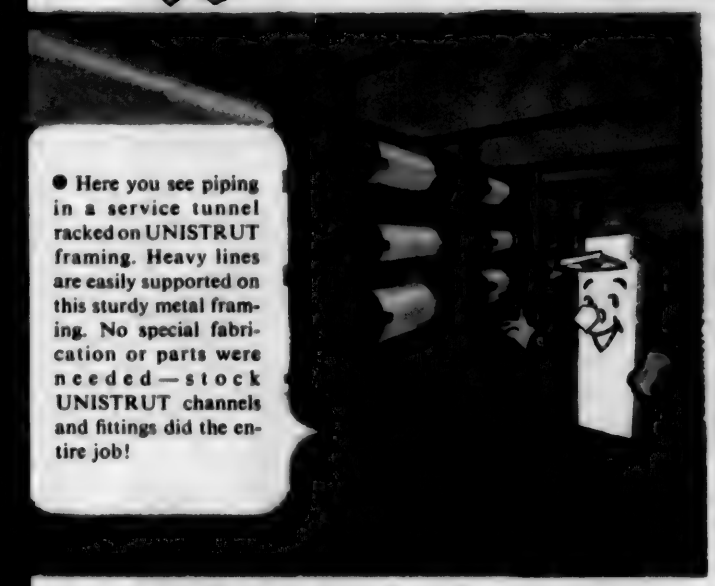
Here are 2 Kewanee No. 5188 Boilers installed at Mrs. Baird's Bread Co.

YOU can depend on KEWANEE engineering

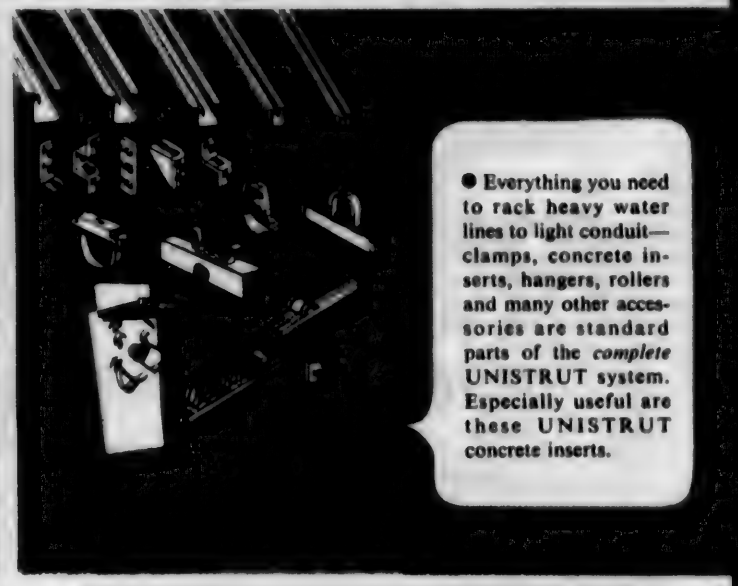
"The Sky's The Limit"

—when you build with UNISTRUT

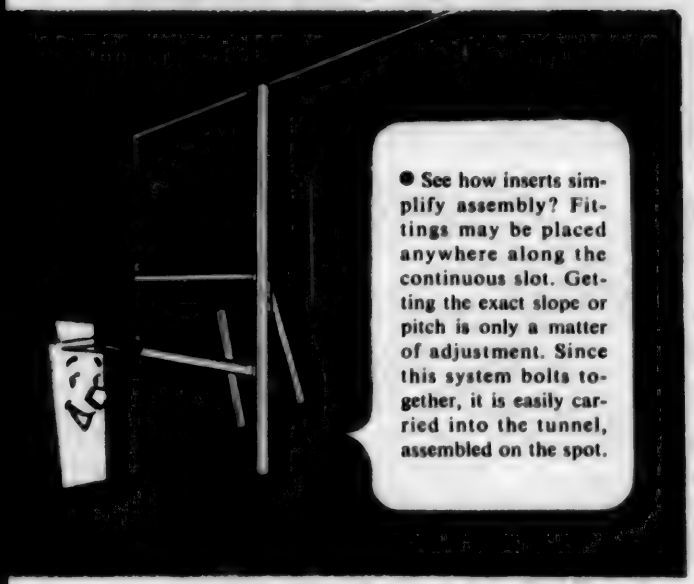
Mr. Strut simplifies pipe racking with cost-cutting UNISTRUT® framing



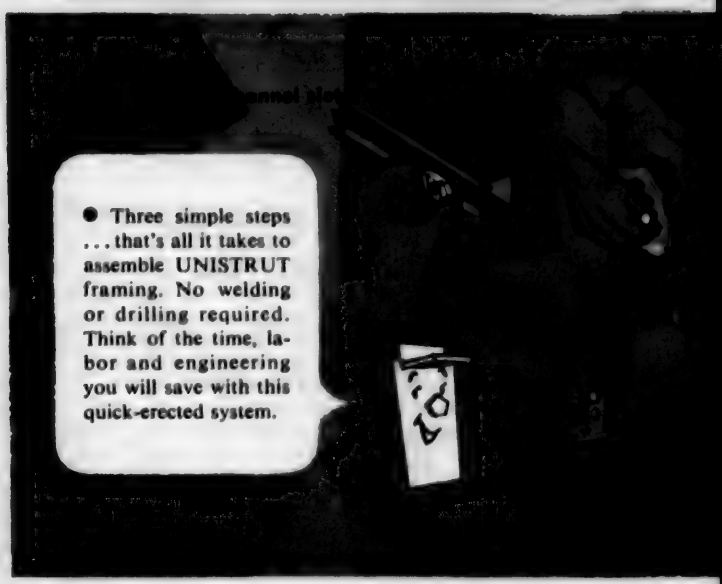
● Here you see piping in a service tunnel racked on UNISTRUT framing. Heavy lines are easily supported on this sturdy metal framing. No special fabrication or parts were needed—stock UNISTRUT channels and fittings did the entire job!



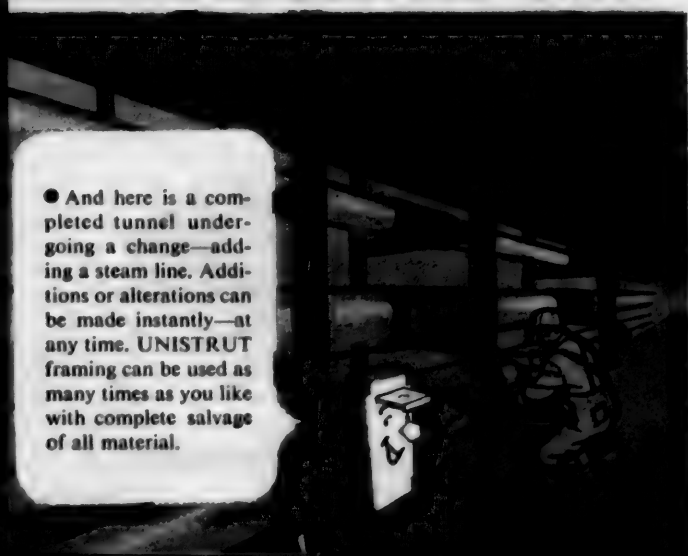
● Everything you need to rack heavy water lines to light conduit—clamps, concrete inserts, hangers, rollers and many other accessories are standard parts of the *complete* UNISTRUT system. Especially useful are these UNISTRUT concrete inserts.



● See how inserts simplify assembly? Fittings may be placed anywhere along the continuous slot. Getting the exact slope or pitch is only a matter of adjustment. Since this system bolts together, it is easily carried into the tunnel, assembled on the spot.

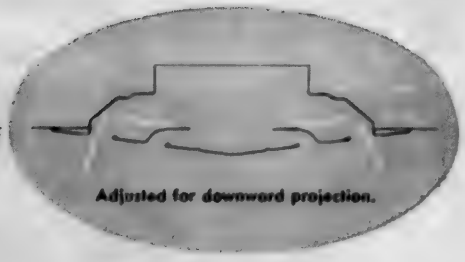


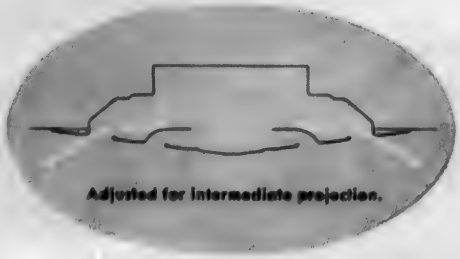
● Three simple steps . . . that's all it takes to assemble UNISTRUT framing. No welding or drilling required. Think of the time, labor and engineering you will save with this quick-erected system.



● And here is a completed tunnel undergoing a change—adding a steam line. Additions or alterations can be made instantly—at any time. UNISTRUT framing can be used as many times as you like with complete salvage of all material.

Take a look at a TRULY ADJUSTABLE Diffuser





AGITAIR®

TYPE "OA"

Here's a distinctively different diffuser with a radically new means of controlling air direction at four different angles of discharge simultaneously.

Without changing the position of the spinnings, **AGITAIR "OA" diffusers can be adjusted to put the air where you want it in one, two, three or four directions . . .** ***after installation.*** **Result: Segmentized . . . positive adjustability with Finger-Tip Air Direction Control.**

Write for Bulletin C-101

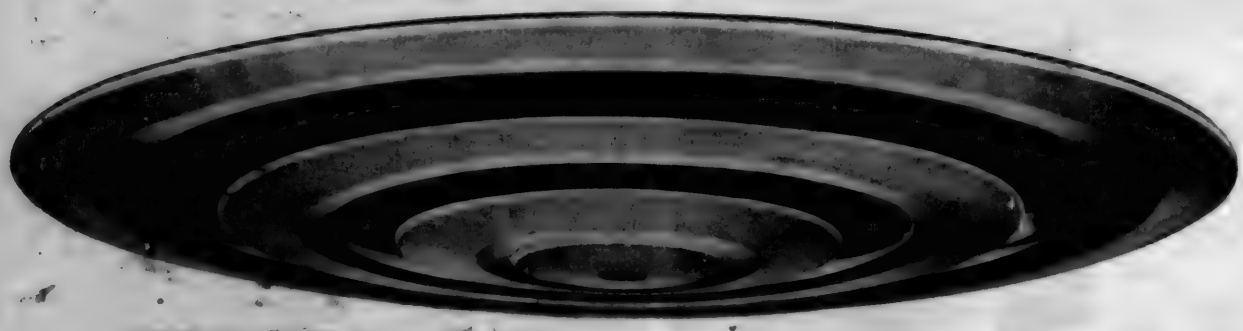
Contains complete data, performance charts, construction details, etc.

You Get Better Air with AGITAIR

AIR DEVICES INC.

185 MADISON AVENUE NEW YORK 16, N. Y.

Air Diffusers • Filters • Exhausters



Air view of Nabisco's new Chicago bakery indicates its unusual architectural conception as well as its huge size.

keeping steam cheap . . .

B&W Integral-Furnace Boilers, Type FM, in service at Nabisco. Delivered completely shop-assembled, FMs are ready to skid or lift into position, connect to services, and place in operation.

World's Largest Bakery

served by 3 B&W *Integral-Furnace Boilers, Type FM*

Typical of the increasing demand for the B&W Type FM Boiler was the choice of a multiple-unit installation for the largest, most modern bakery in the world, capable of producing 167 million pounds of baked goods annually. Occupying 12 acres of a 45-acre site, National Biscuit Company's new Chicago bakery is an outstanding example of scientific application of straight-line mass production methods combined with the highest standards of cleanliness and sanitation, and striking architectural beauty.

Since January 1952, the three FM units have been generating steam for heat, hot water, and various processing operations, such as melting shortening for easier unloading from tank cars and to facilitate its distribution within the plant.

Designed to produce 25,000 lb of steam per hr each at 110 psi pressure, the B&W Units are oil-fired—make a positive contribution to the elimination of smoke and fly ash required by Nabisco. Choice of the three FM boilers rather than a single, larger unit resulted after careful consideration of all factors and a realization that the FM unit offers the benefits of "package" steam combined with many cost-saving big-boiler advantages.

COST-SAVING FEATURES of the B&W Type FM Boiler

- Saves Erection Time and Cost
- Meets Wide Range of Service
- Handles Quick Load Changes
- Fast Steaming
- Low Maintenance
- Easy Accessibility
- Suitable for Outdoor Service
- Burns Oil and/or Gas
- Saves Fuel
- Saves Space
- Safe, Automatic Operation

Satisfaction with the performance of the B&W Type FM Boiler is proved by the number of units in service and on order for industries, utilities, and other users in practically every category. In terms of total steam capacity they add up to well over 10,000,000 lb per hr, and better than half of this capacity is in multiple-unit installations. The compact, shop-assembled FM is available in standard sizes for loads ranging from 2900 to 40,000 lb per hr at steam pressures to 235 psi—is also available for higher pressures, and with moderate superheat.

Bulletin G-76A describes in detail the many cost-saving features of this self-contained, popular small boiler. Write for your copy. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd St., New York 17, N. Y.

G-642 A

BABCOCK & WILCOX BOILER DIVISION

For multi-room air conditioning...

New smaller UniTrane Units

Everything you asked for in a completely new line, completely new design—the new Trane UniTrane air conditioning units! In 4 new sizes, 4 completely new models . . . same capacities but reduced dimensions!

You asked for a smaller, more compact cabinet. And the *new* UniTrane's got it! The *smallest* cabinet in UniTrane history. A scant 2¼ *sq. ft.* floor area for the smallest unit. All models are surprisingly compact . . . save space, allow greater design freedom.

You asked for a new "slim look." And the *new* UniTrane's got it! The vertical model over-all depth—9 *inches slim!* Or 25% *slimmer* than previous models. Hugs the wall—for clean, modern room design.

You asked for a low silhouette. And the *new* UniTrane's got it! The low, *low* look . . . vertical cabinet model is only 25 inches high. Top edge comes *below* the window line!

You asked for "whisper quiet" operation. And the *new* UniTrane's got it! Low coil face velocity is the reason. That means air is moved *gently* . . . without whistle, whine or wheeze!

. . . now 25% slimmer!

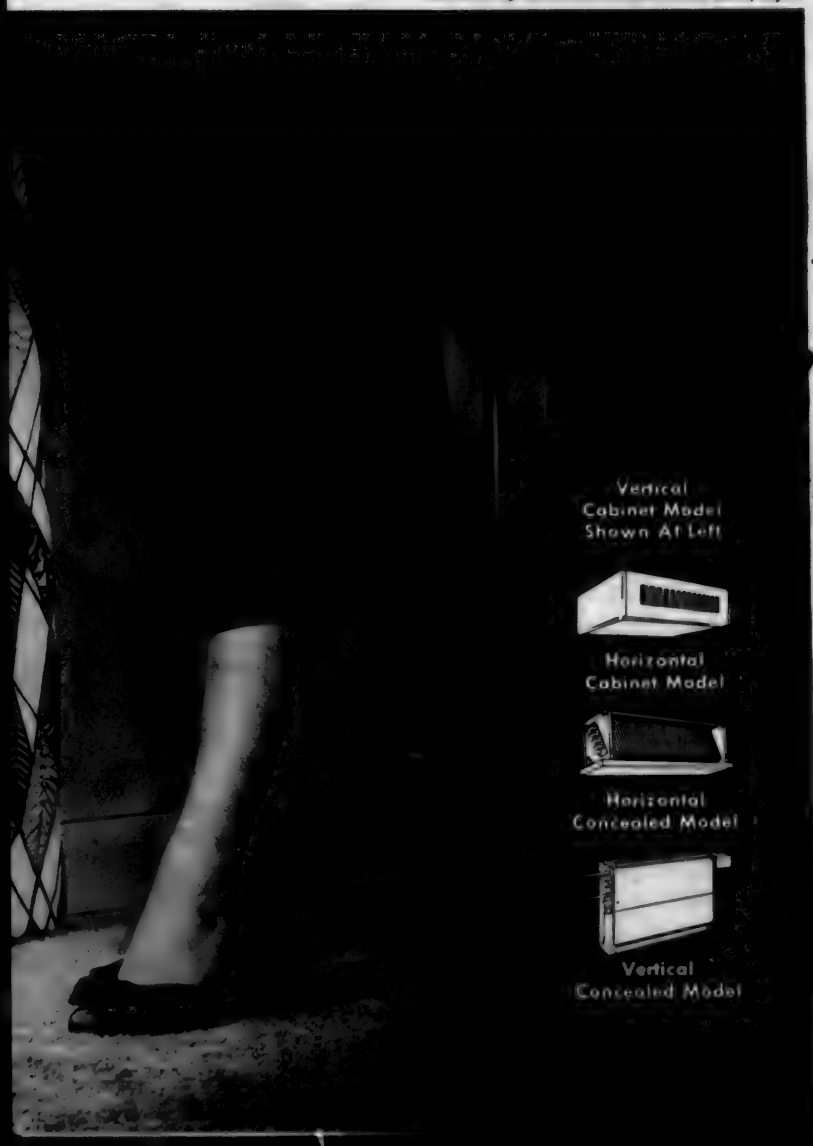
You asked for even greater flexibility. And the *new* UniTrane's got it! Round-edge end panels on cabinet model may be removed to facilitate butting unit to shelving. Rubber seal bonds unit to wall . . . gives free-standing models that built-in look. And the 4 new models—*each in 4 sizes*—that means you fit the air conditioning to the building . . . *not* the building to the air conditioning!

For year 'round comfort, plus outstanding beauty and operating efficiency, UniTrane is your answer. Single pipe circuit provides hot water for winter heating, cold water for summer cooling.

Want the Facts?

Get your advance copy of the new bulletin giving full particulars on the beautiful new UniTrane line. Just contact your nearest TRANE Sales Office or write TRANE, La Crosse, Wisconsin.

Furniture by Midwest Furniture Showrooms, Mpls.

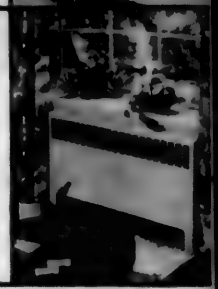


SPECIFY TRANE MATCHED EQUIPMENT

CenTraVac hermetic centrifugal compressor. Only one major moving part. Starts, stops, runs unattended. Automatically adjusts capacity and horse power from 100% to 10% of load.

Cold Generator is the packaged water chiller for smaller installations. Engineered, built, tested and refrigerant-charged at factory. 10 to 100 tons.

Convectors replace bulky radiators when it is desired to leave existing heating system intact and use transom model UniTrane units for cooling only.



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TRANE

MANUFACTURING ENGINEERS

One source, one responsibility for:
Air Conditioning · Heating · Ventilating
Heat Transfer Equipment

The Trane Company, La Crosse, Wis. • Eastern Mfg. Div., Scranton, Pa. • Trane Co. of Canada, Ltd., Toronto
90 U.S. and 17 Canadian Offices

Yes, and make sure you use adequately-sized dependable steel pipe
MODERN LIVING
CALLS FOR
PLENTY of- WATER
PLENTY of- PRESSURE
Buy your Automatic Water System NOW!

●Plenty of water and plenty of pressure are directly dependent on properly sized pipe. So whenever you install an Automatic Water System, be sure to put in dependable steel pipe from street main to furthest faucet, sized not only for today's requirements, but also adequate for the additions and extensions likely to be needed in the future.

Youngstown

STEEL QUALITY YOUNGSTOWN SERVICE **PIPE**

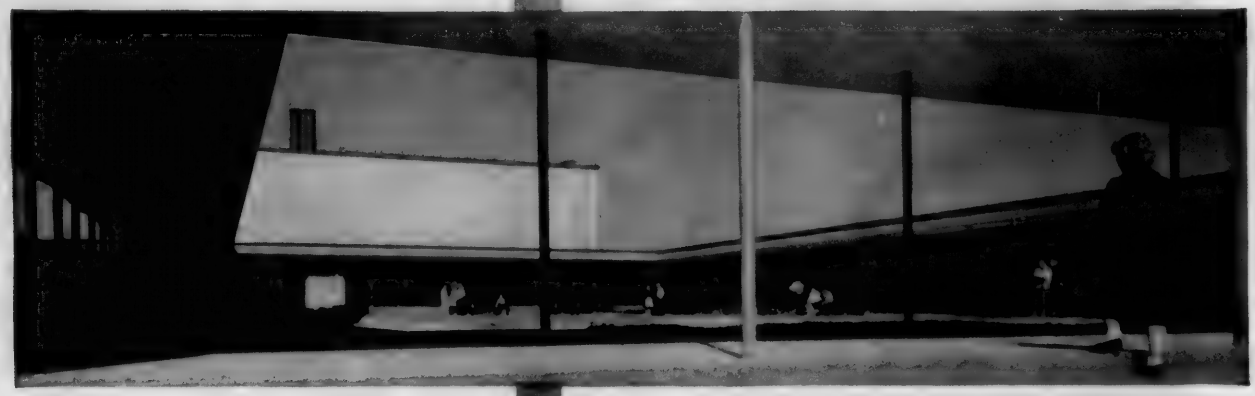
THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of

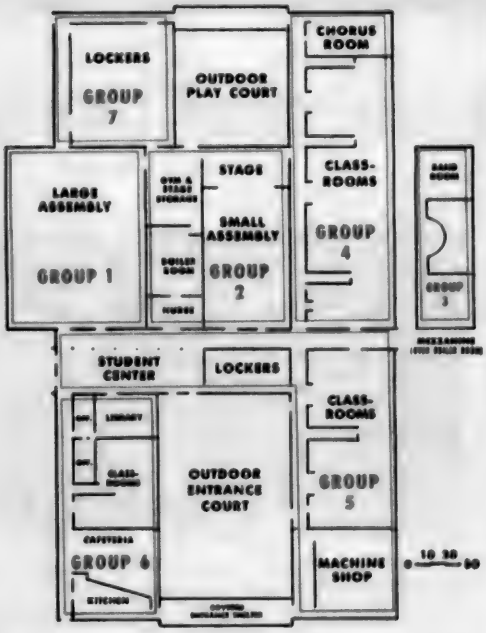
General Offices: Youngstown, Ohio · District Sales Offices in Principal Cities

PLATES · STRIP · PILING · STAINLESS STEEL · SHEETS · TIN PLATE · ELECTROLYTIC TIN PLATE · ALLOY PLATE · CONDUIT · ELECTRIC WELDED TUBING · MECHANICAL TUBING · COLD FINISHED BARS · HOT ROLLED BARS · BAR SHAPES · WIRE · RAILROAD TRACK SPIKES · HOT ROLLED RODS · COKE · PIG IRON · FERROSILICON · TIN PLATE

another award-winning school gains comfort . . . saves fuel with JOHNSON *DUAL* CONTROL



Norman High School, Norman, Oklahoma, recipient of First Honor Award of the American Institute of Architects in 1954. Architects and Engineers: Perkins & Will, Chicago, and Caudill-Rowlett-Scott & Associates, Oklahoma City, and Bryan, Texas. Heating Contractor: Fischer Engineering Co., Norman.



Floor plan shows how Johnson *Dual* Thermostats are grouped for convenience. During regular school hours, a *Dual* Thermostat in each room maintains every space at the ideal comfort level. When classes are over, each group of thermostats is reset, from a central point, for lower, non-occupancy temperatures. In those rooms which continue in use, a touch of the button on the *Dual* Thermostat restores them to normal occupancy temperatures, *without changing the economy settings of the other thermostats.* In a busy school, heating only the occupied rooms can easily save enough fuel dollars to pay for the cost of the entire system!

Comfort *could have been* a real problem in this remarkable school. The size of the building itself is a factor . . . so are the large glass areas . . . widely varied room sizes . . . exposure . . . changing occupancy levels. A busy program of social, athletic and other extracurricular activities is another important consideration.

But comfort *isn't* a problem, and *never will be*, thanks to a pace-setting system of Johnson Automatic Temperature Control engineered to meet the exact needs of this building and its occupants.

Equally important, the special economy features of Johnson *Dual* Control make it possible to provide the finest in individual room temperature regulation at a large saving in fuel costs. The accompanying plan shows how.

You can easily insure the same degree of comfort and economy for your clients' buildings that Johnson has provided for this and thousands of other outstanding buildings of all types and sizes. Remember, Johnson brings to each job over 70 years' experience in solving every conceivable type of temperature control problem—*more specialized experience than anyone else!*

Why not take advantage of this experience? A nearby Johnson engineer will gladly make recommendations for your next building without obligation. JOHNSON SERVICE COMPANY, Milwaukee 2, Wisconsin. Direct Branch Offices in Principal Cities.

JOHNSON CONTROL
TEMPERATURE AIR CONDITIONING

PLANNING • MANUFACTURING • INSTALLING • SINCE 1885

Chance Vought uses air conditioning

Chance Vought, maker of the famous Corsair, is now in full production of delicately machined guided missile Regulus (above) and twin-jet Cutlass (left).

American Blower H&V Units circulate conditioned air in hangars; 21 of these units in missile hangar provide complete change of air every 12 minutes.

Five American Blower Supply Fans and a Sprayed Coil Dehumidifier furnish conditioned air for offices, test laboratory in upper floors of missile hangar.

Chance Vought (foreground) and adjoining plants are leased from the U.S. Navy. Entire air-conditioning installation contains 7400 tons of refrigeration – of which no less than 6600 tons are applied to the load through American Blower equipment.

by the acre in modern Texas factory

American Blower equipment air conditions more than 3 million sq. ft. of factory, office, and hangar space at Chance Vought – the equivalent of nearly 70 acres!

Chance Vought Aircraft, Incorporated, Dallas, Texas, is one of America's foremost aviation pioneers – having produced planes for the Navy since 1917. Currently, it's making some of the world's fastest aircraft and newest guided missiles.

To help meet exacting manufacturing standards – and to insure efficient production – Chance Vought uses American Blower equipment to air condition more than 3,000,000 sq. ft. of floor space in its factory, offices and hangars.

The system – which includes American Blower Supply and Exhaust Fans, Air Conditioning Units, Chilled Water Cooling Coils, Heating & Ventilating Units, Sprayed Coil Dehumidifiers, Utility Sets, and Steam Coils – accurately controls humidity; maintains pre-selected indoor temperatures, ranging from 75° to 85° F. – providing ideal year-round manufacturing and working conditions.

Do you have an air-conditioning or air-handling problem? American Blower engineers have a complete knowledge of the special problems of many industries. A call, right now, to your American Blower or Canadian Sirocco Branch Office is all it takes to have this expert know-how at your disposal.

Ross Zumwalt, missile-hangar engineering consultant: "American Blower equipment gives top performance."

Carl Wallace, missile-hangar contractor: "American Blower helps contractors in every way."

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN • CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American Radiator & Standard Sanitary Corporation

AMERICAN BLOWER

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

Remotaire Model TRA
for 100% Air Recirculation

New Remotaire Room Conditioner by American-Standard

. . . specially adaptable to interior ventilation systems

● Now American-Standard Remotaire is more versatile than ever. A new unit—the Model TRA—is designed for cooling and heating the peripheral zone of office buildings, hotels, and other buildings which use interior ventilation systems. Fresh outside air is supplied by small ducts connected to the air conditioning system of the interior zone. These ducts usually are located in furred down ceilings and are connected to small side wall outlets or ceiling diffusers. The interior zone system is designed to provide a mixture of conditioned outside air and recirculated air, or for 100% outside air during intermediate seasons.

Designed for total recessing, the new Model TRA uses a simple piping system that carries hot water for winter heating and chilled water for summer cooling from a central plant. Room air is conditioned all year long!

Available in 200, 300, 400 and 600 cfm sizes, the Model TRA unit has three-speed fan control which provides a wide range of air quantities and heating and cooling capacities. A size for every job!

Look what Remotaire offers:

Every Remotaire unit is listed by Underwriters' Laboratory, Inc., Re-examination Service.

One simple piping system for both summer cooling and winter heating.

Individual room temperature control without affecting adjoining space.

Large filters which keep air fresh and clean.

Drain pan runs the entire length of unit to collect condensation drip.

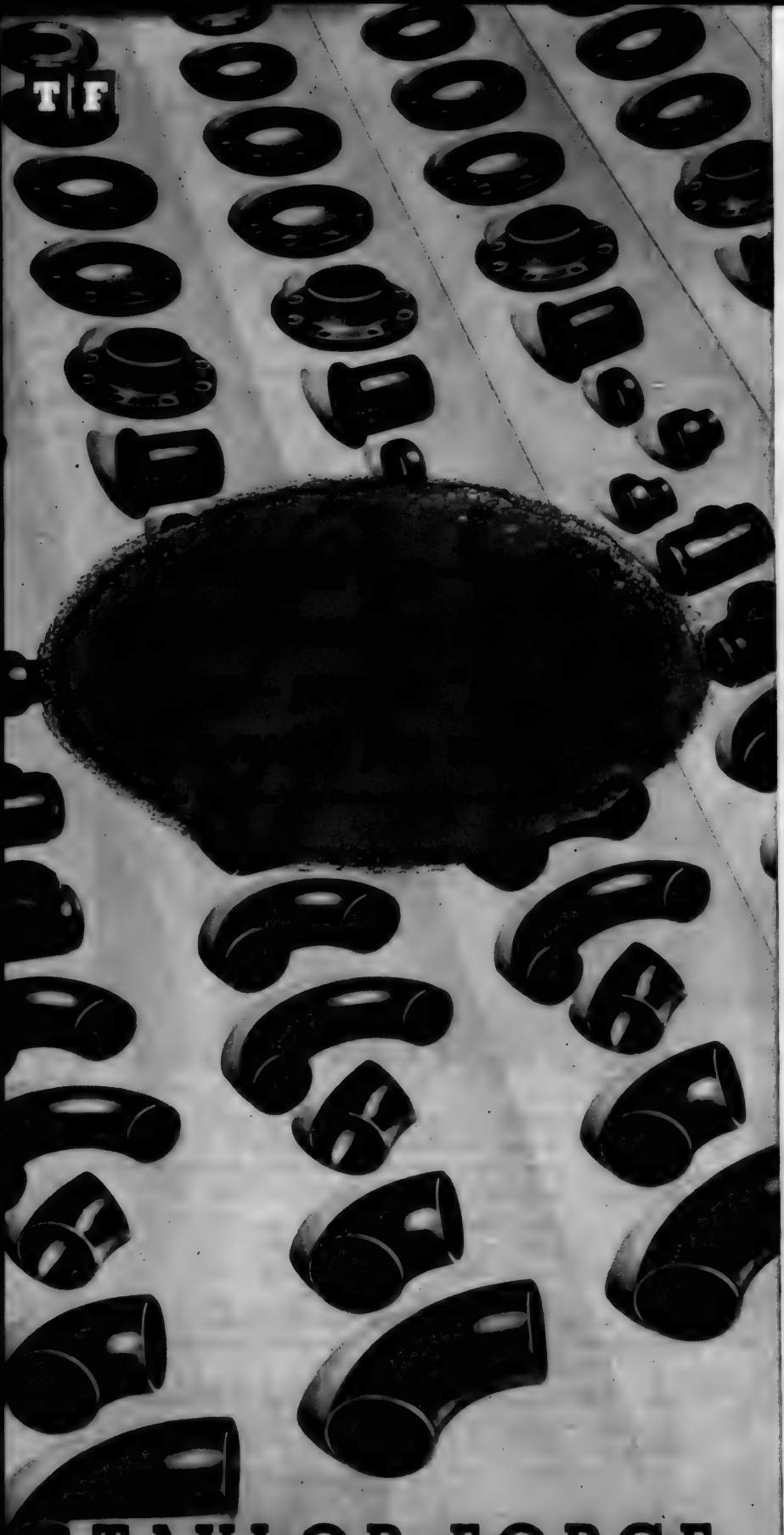
Coil shield prevents foreign matter from falling into coil.

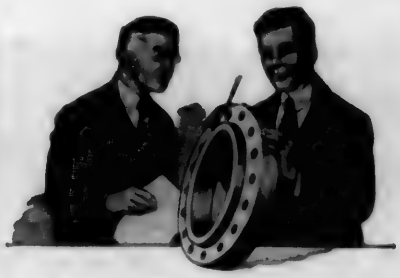
American-Standard Water Chillers for use with Remotaire Systems are available in sizes from 2 to 75 hp. And for the heating cycle, American-Standard has a complete line of boilers for all heating requirements. One dependable source for a *complete* heating-cooling system.

AMERICAN-Standard
WATER HEATING-COOLING SYSTEMS

American Radiator & Standard Sanitary Corporation, P. O. Box 1226, Pittsburgh 30, Pa.

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS





We had to quit guessing in the twenties

The founder of Taylor Forge used to say that "uniformity of strength should be the final goal of every engineer"... and no doubt this kind of thinking motivated the Taylor Forge organization to take so much initiative in the development of forged steel components for pressure piping.

The pattern was set in the twenties. Before 1920 little had been done in the way of pipe fitting and flange standardization. As early as 1905, however, Taylor Forge had produced forged steel flanges for Taylor pipe, and they had proved so superior to cast iron flanges that within a few years more flanges were being made for others than for our own use. But these forged flanges were bolted to the iron flanges of valves, pumps, and the like; so they simply followed cast iron standards.

In view of the obviously far greater strength of forged flanges, this was foolishly safe, and patently not at all in the "Uniformity of Strength" tradition. Moreover, in the twenties pressures were starting their upward climb. The 125 lb. and 150 lb. standard wouldn't do. Now it was 400; then 600; then 900 pounds. As the pioneer and leader in this field, Mr. Taylor saw the need for formulating standards and went to work on it.

Although one of the first studies conducted in this field, his work ranks to this day as one of the most thorough jobs ever done. In this work Mr. Taylor was in touch with Mr. Sabin Crocker, who is author of today's "Piping Handbook." He also collaborated with Professor E. O. Waters of Yale. Mr. Taylor ran exhaustive full scale tests on actual flanges to provide the test data which was then analyzed and formulated by Mr. Taylor and Professor Waters. The result was the Taylor-Waters Formula, presented before the ASME in 1927.

Still found in every engineering handbook, the Taylor-Waters formula was, and is, the basic means of determining flange stress under a given condition of loading. In the years since, Taylor Forge has also played a leading part in bringing standards into correlation with broadening needs . . . but this is *another* story.

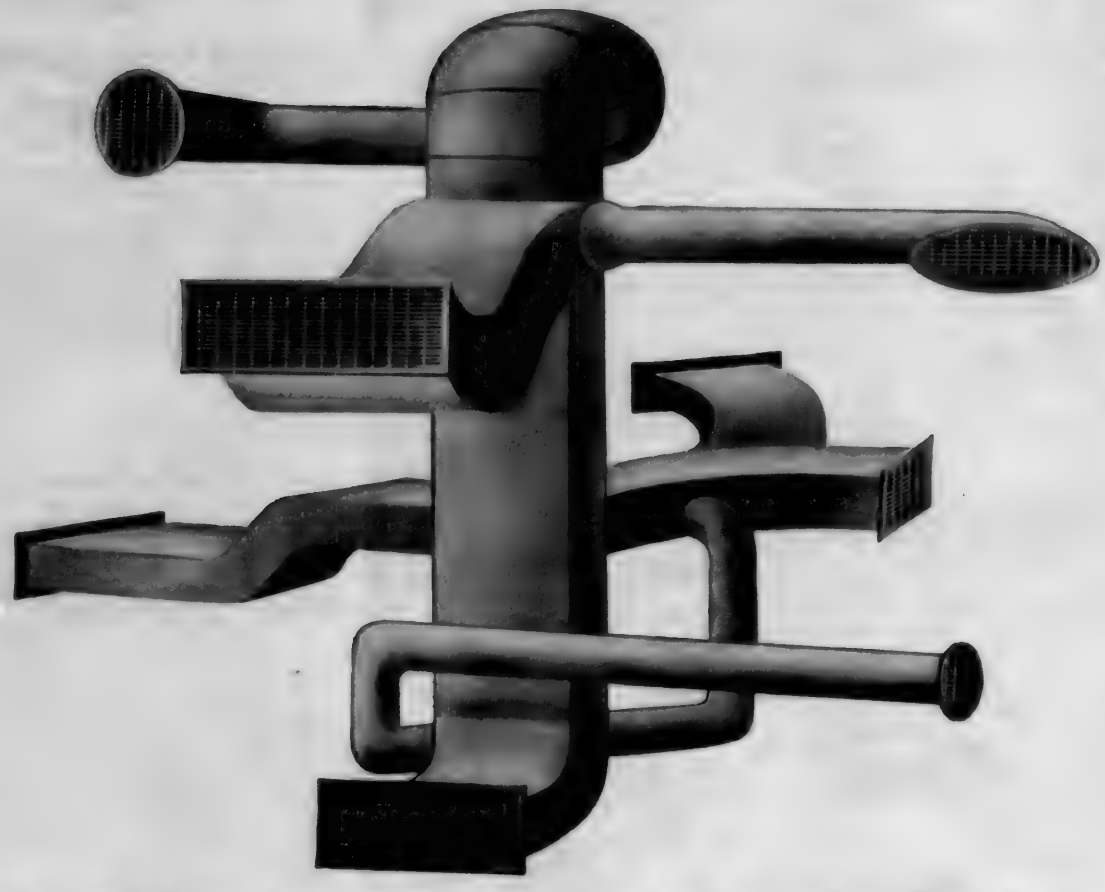
An episode in the story of Taylor Forge leadership in designed piping

TAYLOR FORGE

TAYLOR FORGE & PIPE WORKS • General Offices and Works: P.O. Box 485, Chicago 90, Illinois

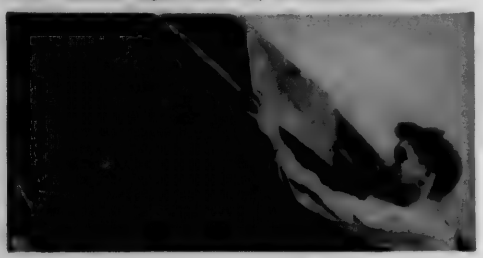
Offices in all principal cities • Plants at: Carnegie, Pa.; Fontana, Calif.; Gary, Ind.; Hamilton, Ontario, Canada

Even if ducts were made like this... Fiberglas could insulate them!



The right product at the right price for every installation

ABOVE—Fiberglas Flexible Duct Insulation—the popular choice for ducts of any cross section. **BELOW**—Fiberglas PF Insulation—light, firm, easy to handle and apply.



If you need an insulation that can cover every shape of duct—round or rectangular—on inside as well as outside surfaces, specify Fiberglas®, made in a form for every purpose. And in addition, Fiberglas insulation gives you all these *plus* advantages:

- Exceptional lightness that eliminates need for extra supports
- Unexcelled thermal efficiency in all forms
- Labor-saving, cost-saving ease of application
- Acoustical properties when noise is a factor
- Wide range of densities, sizes and thicknesses
- Dimensional stability—no shrinking, swelling or buckling
- A rot-proof, moisture-resistant material

You should have full technical data on the world's most popular duct insulations. See our listings in Sweet's File, Chemical Engineering Catalog, or Refinery Catalog—or write to: Owens-Corning Fiberglas Corporation, Dept. 41-E, Toledo 1, Ohio.

A FORM FOR EVERY PURPOSE

PF • VAPOR-SEAL
COATED • FLEXIBLE
FLEXIBLE LINER

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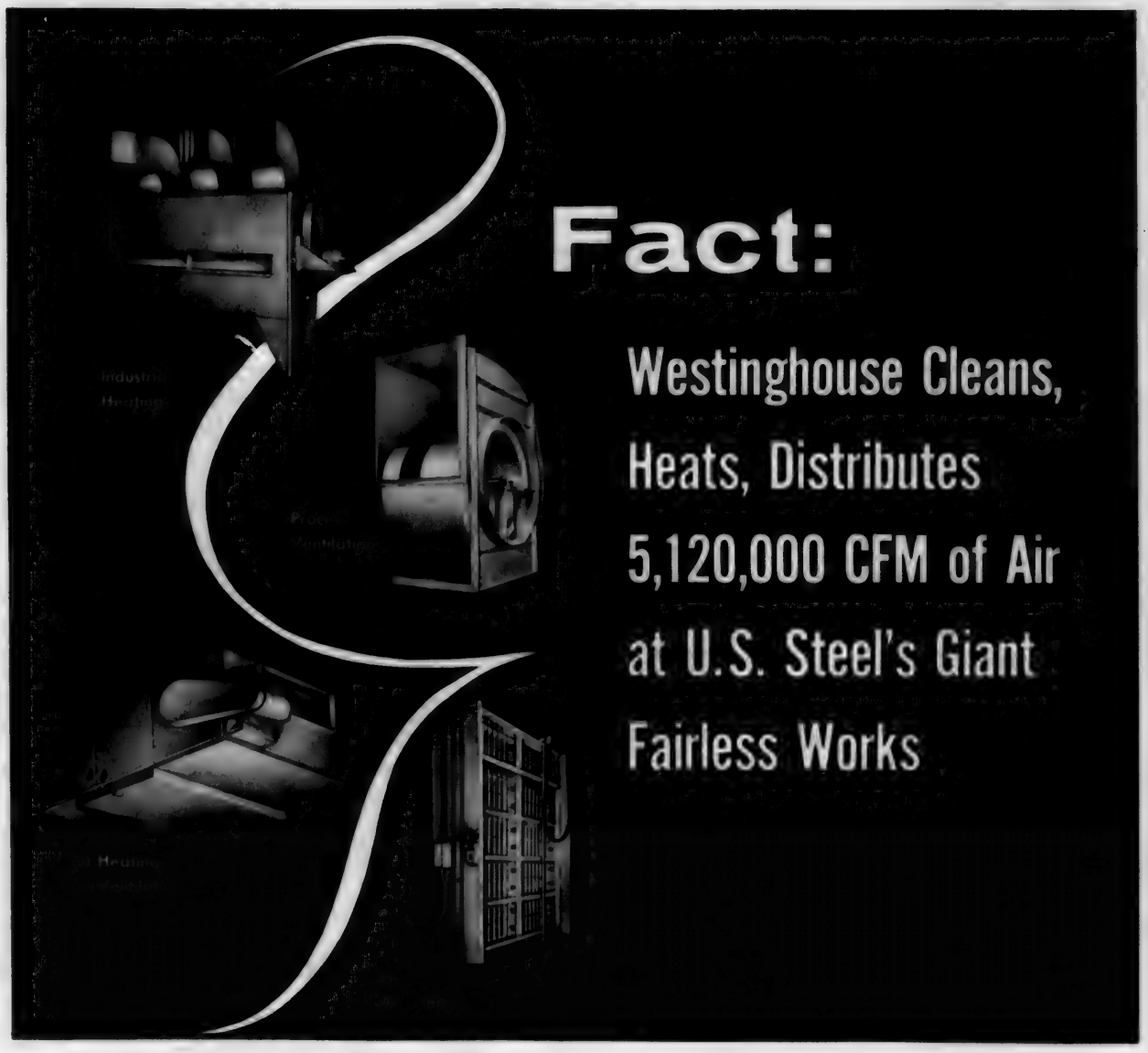

Fact:

Westinghouse Cleans, Heats, Distributes 5,120,000 CFM of Air at U.S. Steel's Giant Fairless Works

Westinghouse has made the Fairless Works of U.S. Steel the outstanding steel mill from the standpoint of air cleaning and ventilation.

This plant uses Westinghouse Industrial Heaters, Centrifugal Fans, Air Handling Units, and PRECIPITRON® Electronic Air Cleaners.

Choose the most complete line backed by undivided responsibility. Whether your requirements are for—

1. Heating and Ventilating
2. Industrial Processes
3. Mechanical Draft
4. Cooling and Dehumidifying
5. Electronic Air Cleaning

—put air to work with Westinghouse-Sturtevant apparatus.

MORE FACTS?

Call your nearest Westinghouse-Sturtevant Sales Engineer . . . he's the "Man with the Facts" on heating, air handling, and electronic air cleaning . . . or fill in the coupon below.

WESTINGHOUSE AIR HANDLING

YOU CAN BE SURE...IF IT'S

Westinghouse

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NAME AND TITLE.....

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THE EXCLUSIVE

snap action

FEATURE ELIMINATES WIRE DRAWING

illinois STEAM TRAPS

SIMPLE—EFFICIENT—DEPENDABLE

The valve action of an Illinois trap is instantaneous. It is either wide open or tight shut. Wire drawing is impossible. The valve stem travels independently of the bucket—no other trap has this feature.

Here are some "reasons why" of Illinois' outstanding popularity:

SIMPLE—moving parts are valve and bucket only, all motion vertical...**CANNOT AIR-BIND**—continuous air venting through thermostatic air vent—no steam loss ...**CANNOT BLOW STEAM**—valve always water sealed...**NO LEAKAGE AT REDUCED PRESSURE—NO LEAKAGE AT REDUCED RATE OF FLOW**—at any point in the range...**NO CHATTERING DURING FLOOD CONDITION**...**SURFACE DISCHARGE**—flushes out all grease and sludge...**VALVE AND SEAT**—hardened steel alloy...**INSPECTION EASY**—without disturbing piping...**DRAINS CONDENSATE EQUALLY WELL**—from compressed air lines, air separators, air aftercoolers, gas mains.

Sizes from ½ inch to 2 inches and pressures from 5 psi up to 250 psi.
Extra heavy duty steel bodies for pressures up to 600 psi.

ILLINOIS ENGINEERING COMPANY

DIVISION OF AMERICAN AIR FILTER COMPANY, INC.

2045 SOUTH RACINE AVENUE • CHICAGO 8, ILLINOIS

THE BANTAM THAT PACKS A HEAVYWEIGHT PUNCH

BALDOR

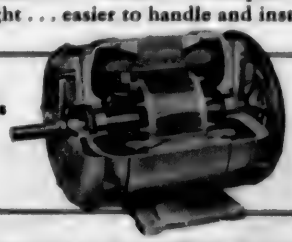
The new *Streamcooled Baltric* line of completely enclosed motors are champions, every one, all sinew and muscle . . . compact, powerful, efficient. Advanced engineering using the newest materials, enables Baltric to offer you hard-working power packages.

These are tomorrow's motors today! Greater efficiency with less weight and bulk . . . insulation is lighter and better.

Built to NEMA standards, Baltric's your best bet . . . doesn't waste space . . . doesn't waste weight . . . easier to handle and install.

BBSS-B

- Exclusive One-piece Stator Frame
- Rotor Provides Improved Torque Characteristics
- Solid End Plates Completely Enclose Motor
- Base Design Permits Flexibility in Installing Or Replacing



Original *Streamcooled* Motors Also Available—Built to Former NEMA Standards

ALL *BALTRIC* MOTORS TOTALLY ENCLOSED AND *STREAMCOOLED*

BALDOR ELECTRIC COMPANY

Baltric Motors Are Available In Polyphase • Squirrel Cage • Induction and Single Phase • Capacitor Start • Induction Run Types

4353 DUNCAN AVENUE • ST. LOUIS 10, MISSOURI

Q. What does the Continental Automatic Boiler have that no other similar type boiler has?

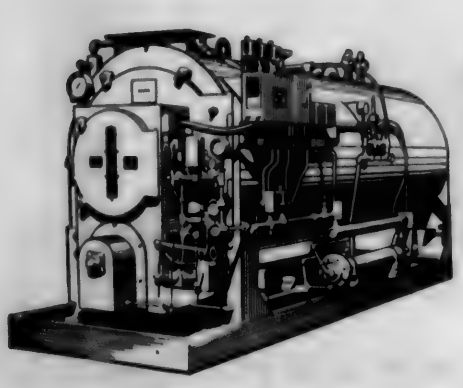
A. A special front-end design that employs two concentric rows of guide vanes which direct air in a spinning stream into the boiler, forming, in effect, a multiple-lead air-screw that provides uniform delivery of air and thorough mixing of air with fuel. Result: high rate of heat transfer to the surrounding water-cooled furnace — a reason why this 2-pass boiler has an efficiency of over 80% guaranteed.

Q. What outstanding features do the manufacturers of the Continental Boiler claim?

A. A special tube-sheet design that assures long service life. Water circulation that is uniform, free, rapid. 2-pass design that provides even flow of combustion gases to all heating surfaces. Heating surfaces arranged so that there is a centrally located furnace and equal spacing of all return tubes. Simplified construction that affords ease of accessibility and economy of maintenance.

Q. What was the comment made by an engineer who has followed packaged boiler design and construction for many years?

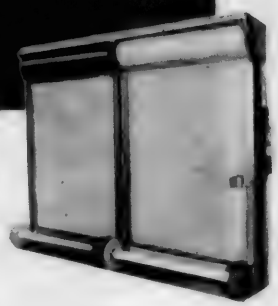
A. At the recent Power show this man gave an unsolicited testimonial. He said: "I've seen them all and I've never seen a packaged boiler built as well as this one." He specifically commented on the quality of the construction and the simplicity of build on the Continental Boiler.



Q. How can you get all of the facts on the Continental Boiler?

A. Right now, write for Bulletins BE3 and BE4 that describe the boiler and the "spinning gas technique". Write to Boiler Engineering & Supply Co., Inc., Phoenixville, Pa.

AN AIR FILTER CURTAIN
5 Ft. Wide and
1 YEAR LONG!



ROLL-O-MATIC renewable media filter of two sections 5'0" x 8'0" high.

AAF Roll-O-MATIC OPERATES FULL YEAR ON SINGLE ROLL OF MEDIA

PICTURED above is a 5 ft. wide, 70 ft. long renewable media filter curtain for the new AAF ROLL-O-MATIC. When wrapped on a spool, this "blanket" of bonded glass fibers becomes a roll only 13" in diameter.

But here's the maintenance "miracle"! This single filter curtain, installed in a ROLL-O-MATIC section up to 11 ft. high (18,000 cfm) represents a full years supply of media under normal operating conditions. Its cost—just half that of disposable filters of equal capacity and you haven't spent that first man-hour dollar for maintenance.

Simplicity of operation adds further to ROLL-O-MATIC's savings story. The media travels as a continuous curtain down the face of the filter and is re-rolled at the bottom. Movement of curtain to maintain desired operating resistance is controlled by an automatic time switch.

For complete information on "clean air by the roll", call your local American Air Filter representative or write for ROLL-O-MATIC Bulletin 248.

AAF herman nelson

American Air Filter
COMPANY, INC.
294 Central Avenue, Louisville 8, Kentucky
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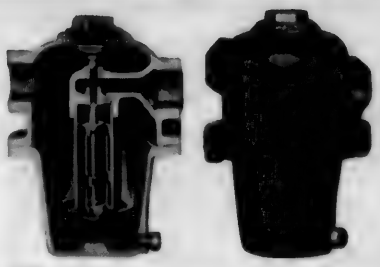

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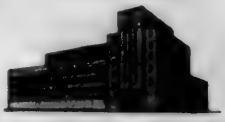

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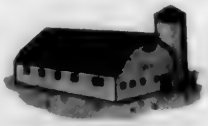

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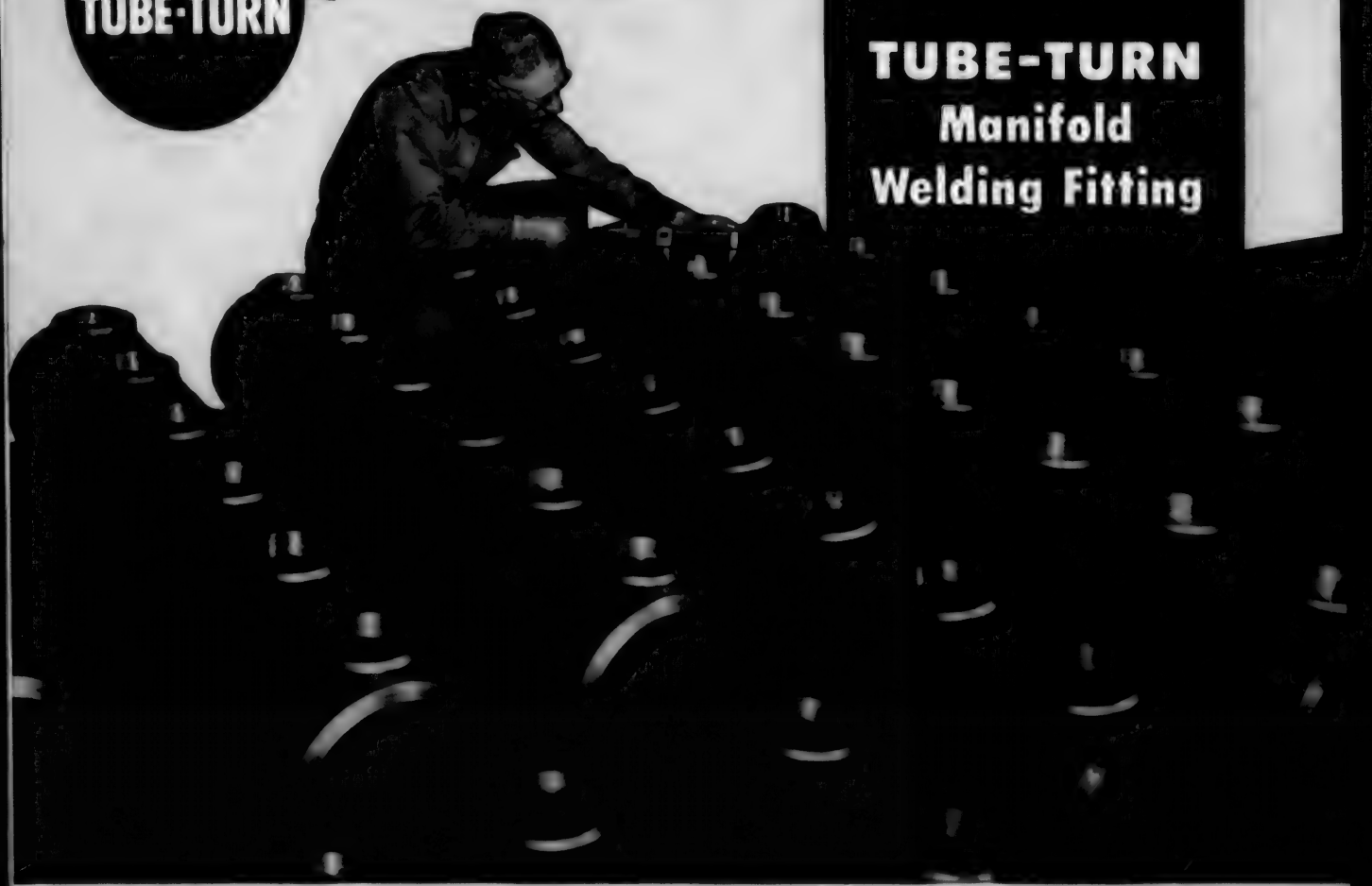

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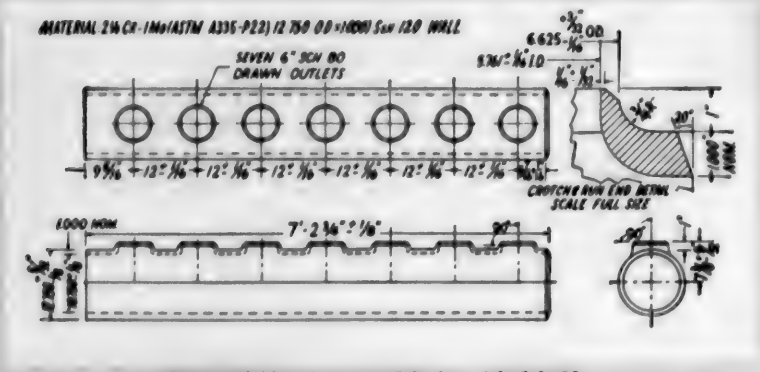

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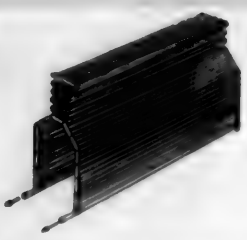

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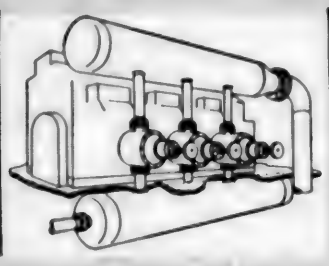

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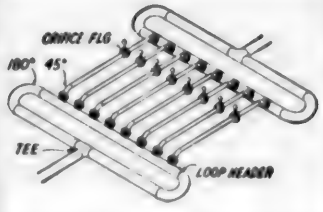

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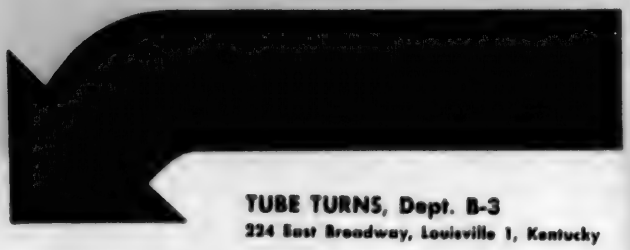

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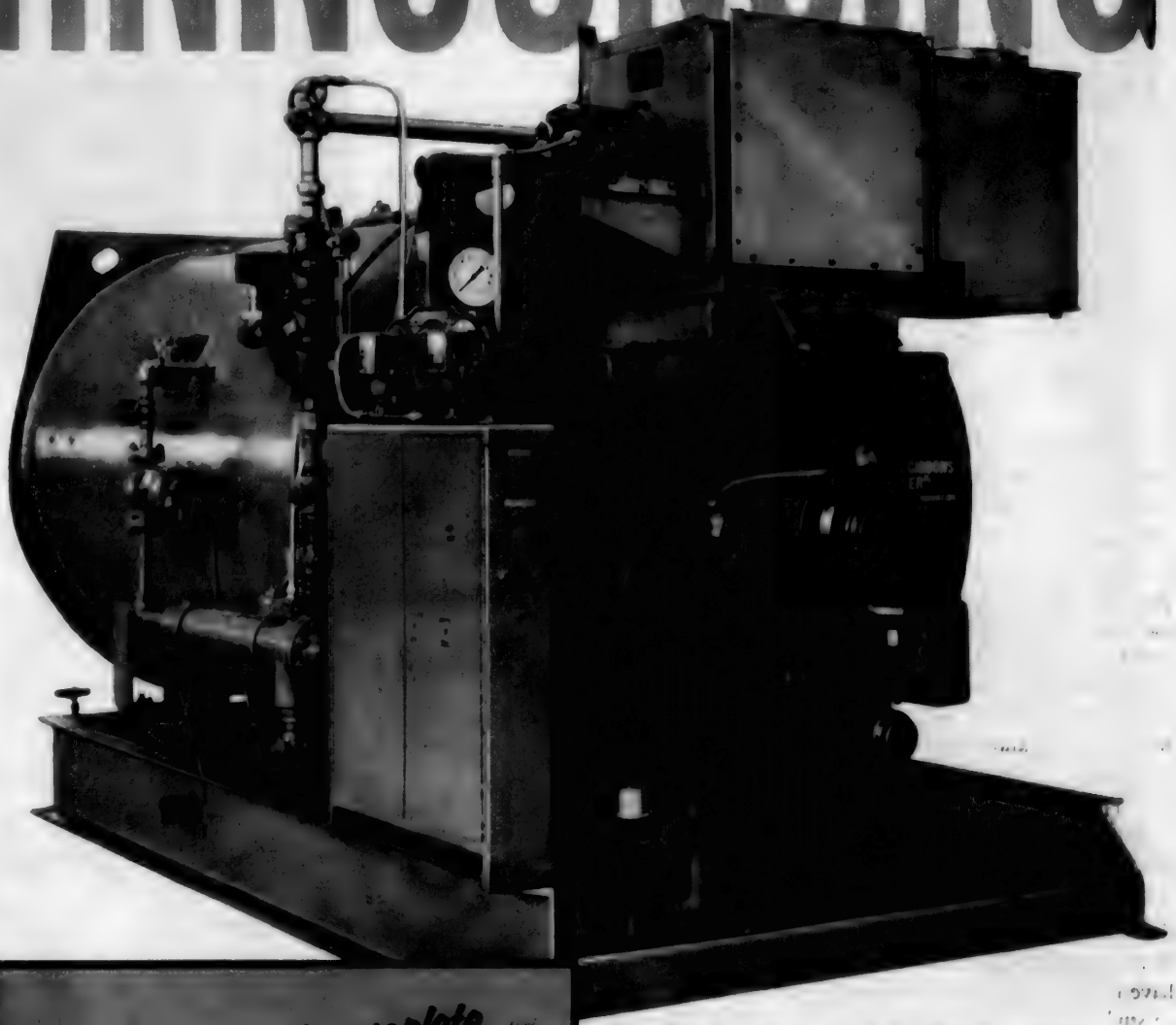

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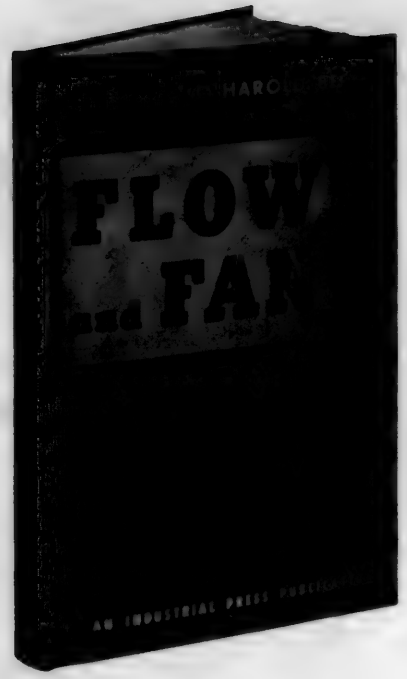

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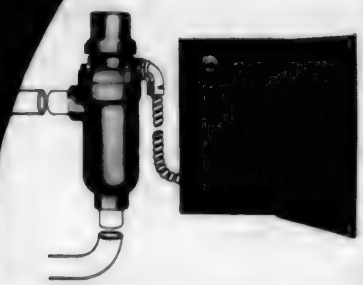

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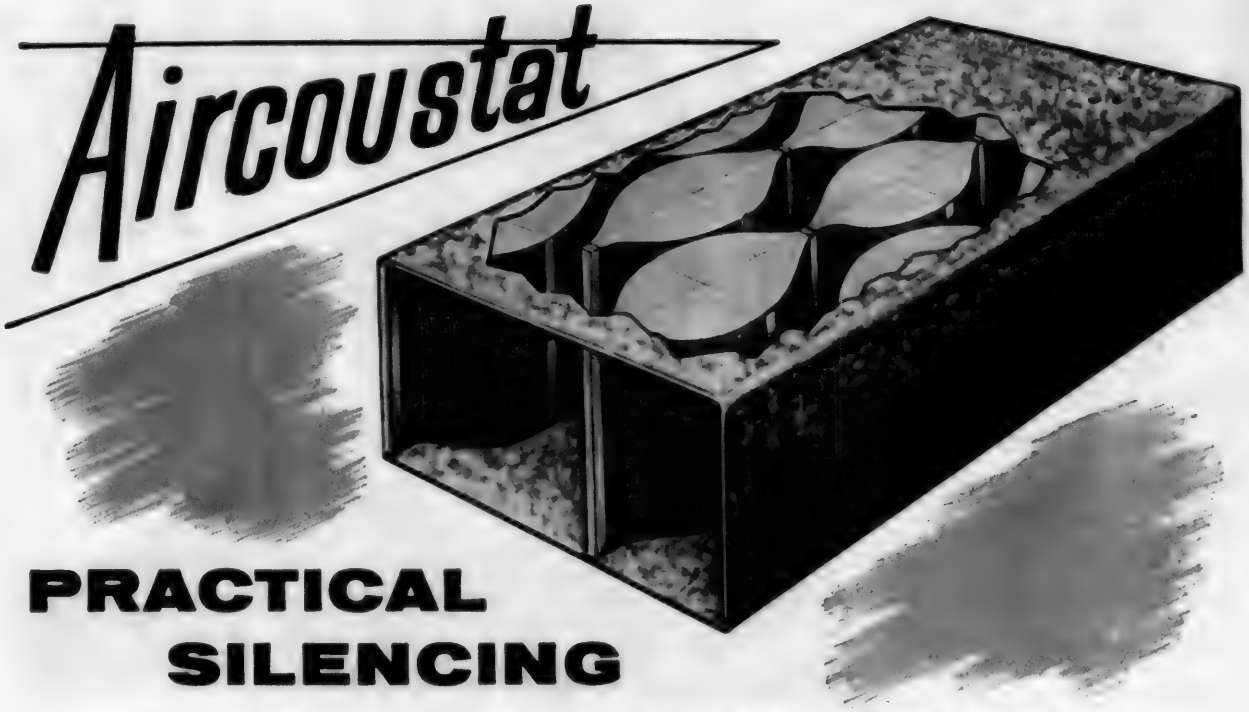

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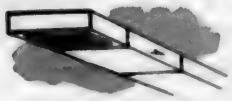
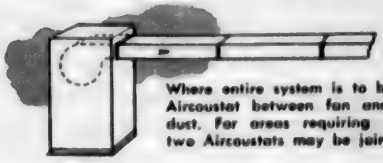


Aircoustats are incorporated as part of the duct work. If only selected areas require quiet, install above individual diffusers.



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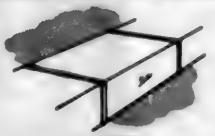

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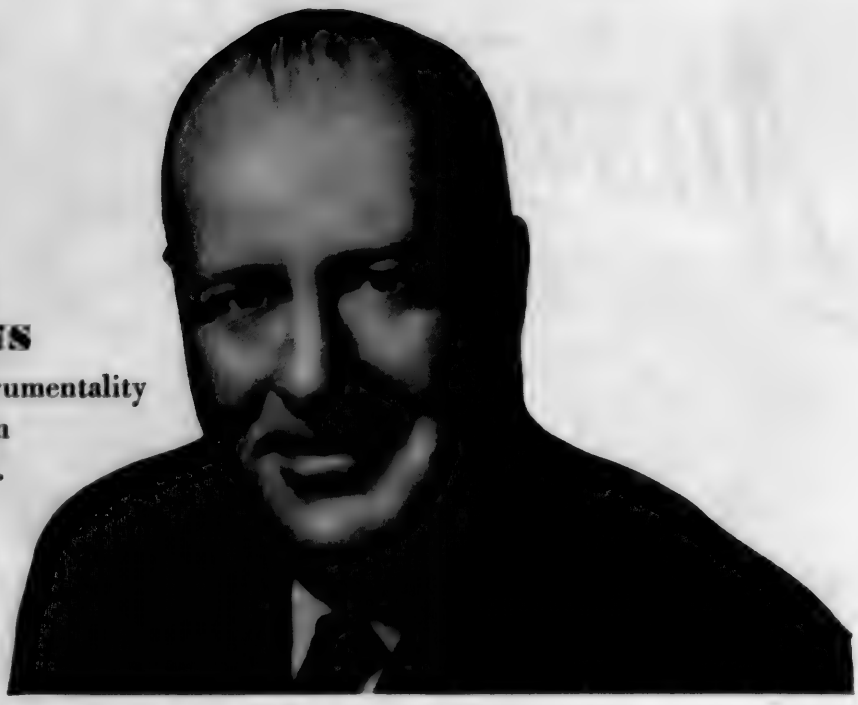

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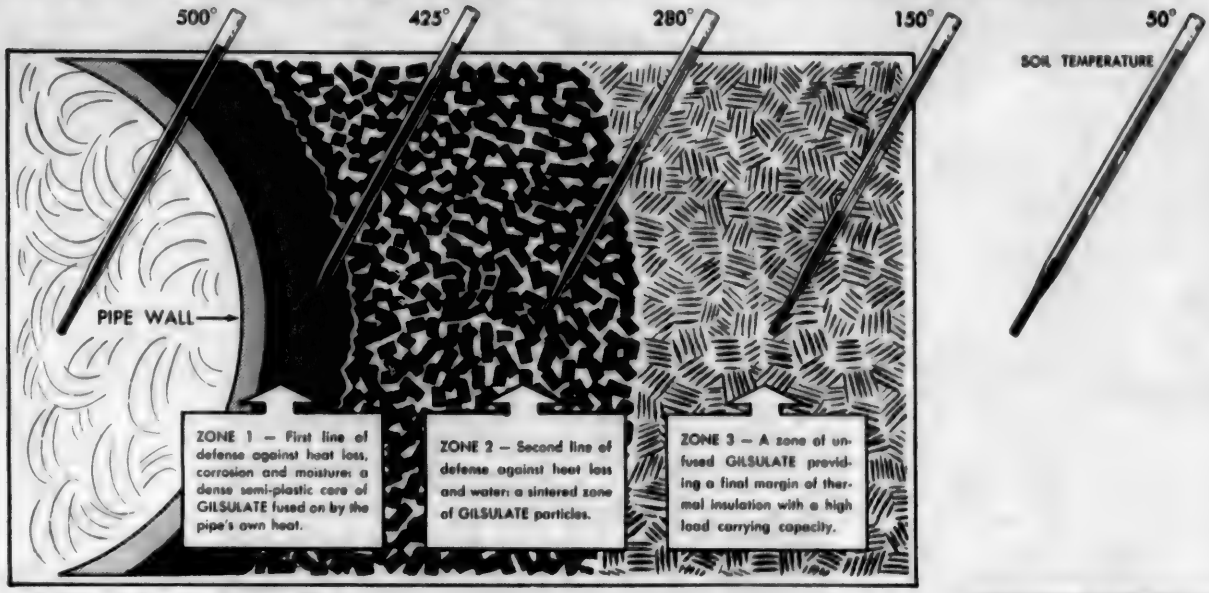
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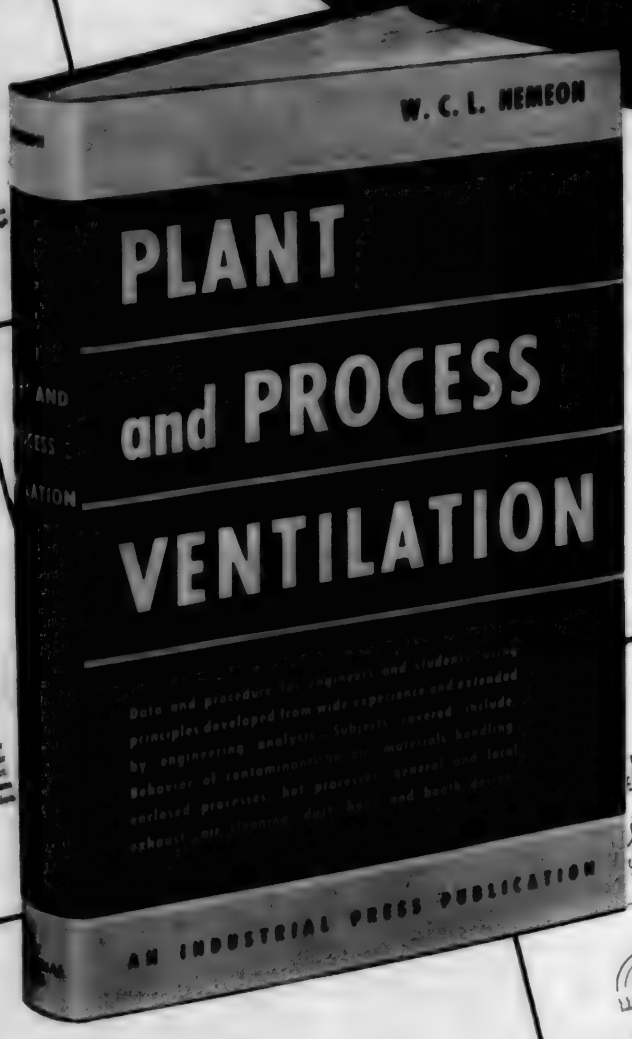

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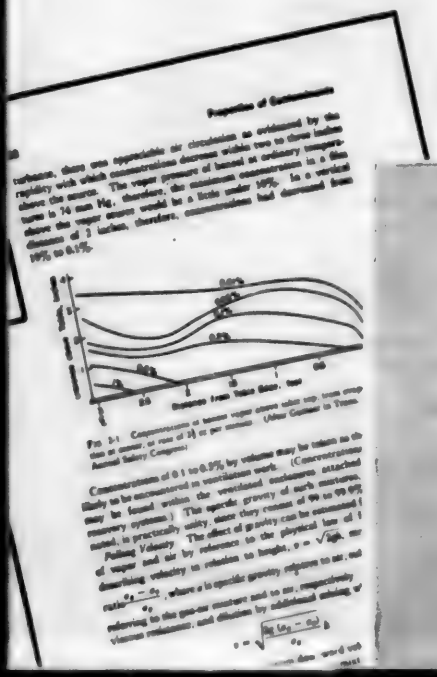

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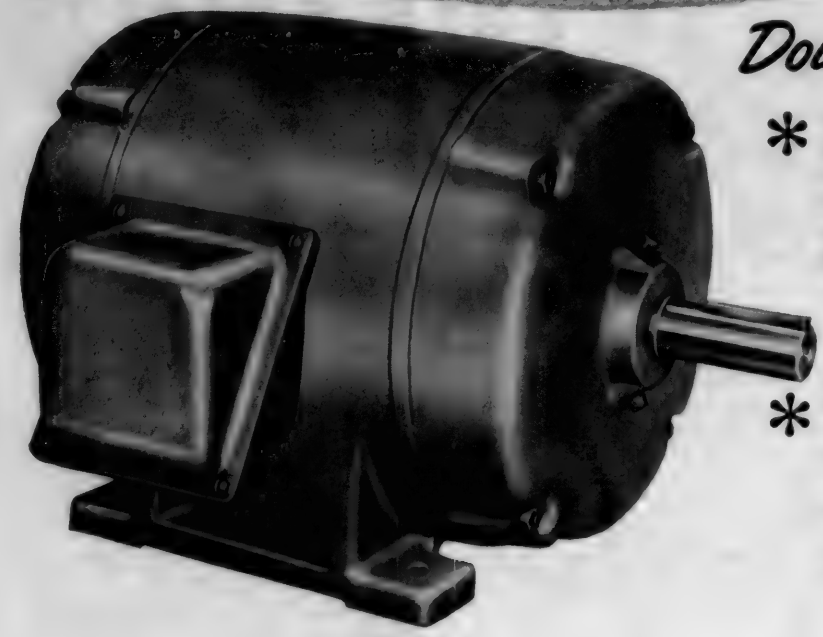

* Wagner Type DP Motors are protected by rugged, corrosion-resisting cast iron frames, smoothly finished so that no moisture can collect on them. Motor feet are cast as an integral part of the frame for extra strength and rigidity.

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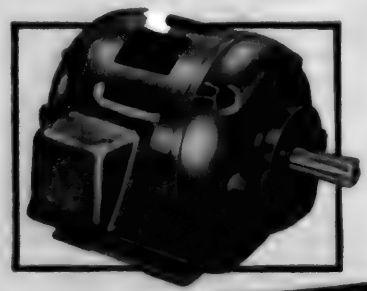

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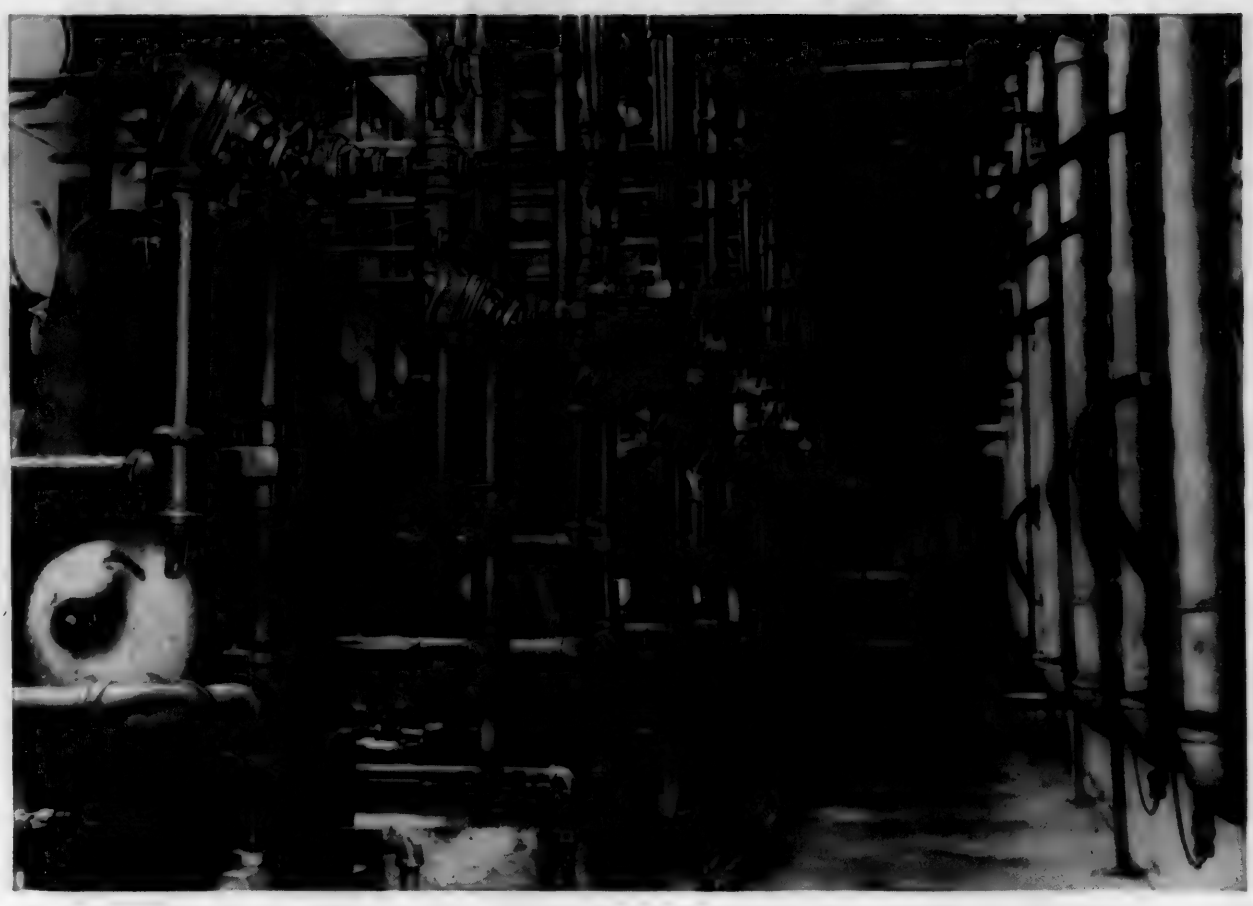

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Now in service more than a year, none of the Crane Kel-F Diaphragm Valves have needed any maintenance. Their simplified construction, giving a longer-life diaphragm . . . tighter bonnet seal and seating . . . and easier operation . . . is the reason. And that's typical of Crane quality . . . always the bigger value for thrifty buyers of valves and fittings. General Offices: 836 S. Michigan Ave., Chicago 5, Ill. Branches and Wholesalers Serving All Industrial Areas.

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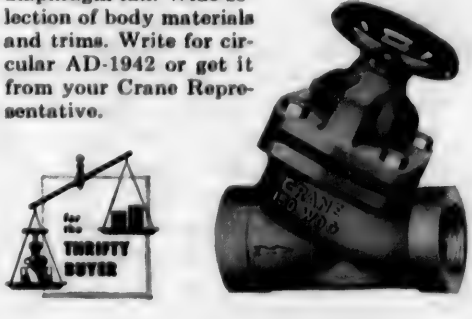

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- Flexibility permitting addition of radiation without changing basic pump installation.
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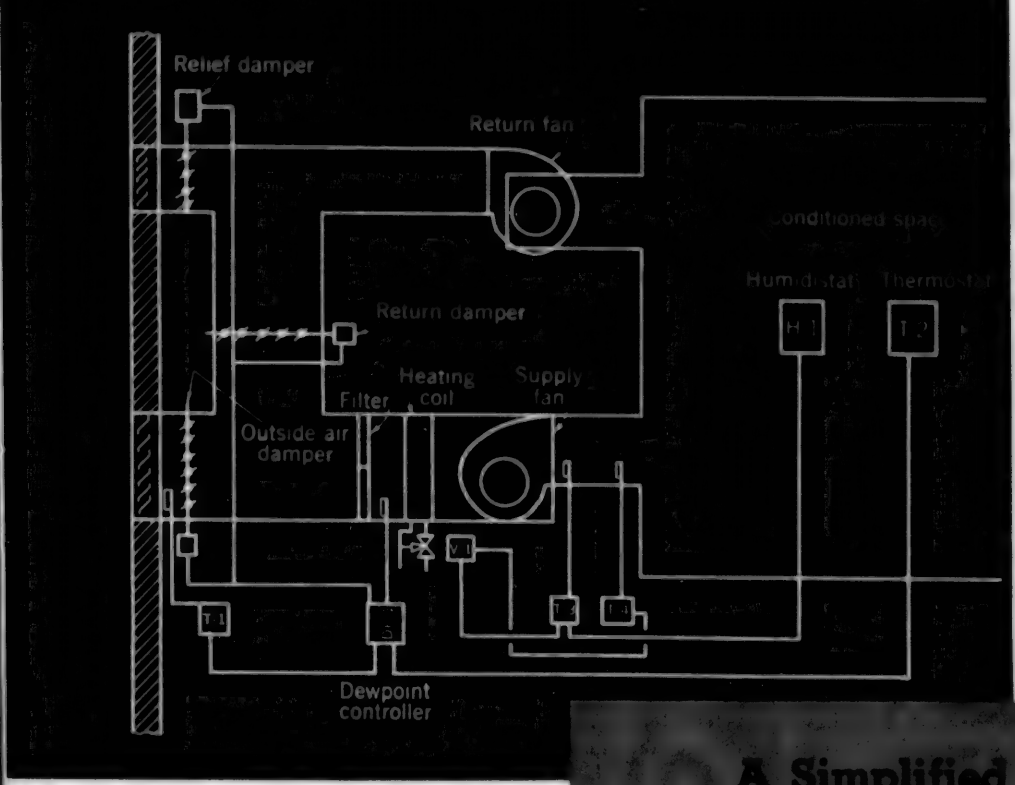

Fig. 1. Schematic control diagram.

A Simplified Method for Maintaining Constant Relative Humidity

ARTHUR D. BENJAMIN

Project Engineer, Voorhees Walker Smith & Smith, New York

MANY manufacturing, storing, and material handling situations require constant relative humidity conditions where close control of temperature is not a prime consideration.

Heretofore, systems designed to maintain constant humidity have been capable of heating, cooling and dehumidifying. The simple apparatus described here will maintain the humidity constant without the use of refrigeration. The advantages gained from the use of the simplified method are obtained by the manipulation of the psychrometric processes as dictated by the control system.

The control system should be pneumatic and consist essentially of the following components with reference to Fig. 1:

T-1	Outside air master thermostat,
DP-1	Dewpoint controller (indicating type),
T-2	Room changeover thermostat,
T-3	Discharge high limit thermostat,
T-4	Discharge low limit thermostat,
H-1	Room humidistat,
V-1	Hot water three way bypass valve

In common practice, systems that are designed to maintain constant relative humidities are comprised of two cycles; heating and cooling. The system described here eliminates the refrigeration cycle completely. It depends solely on a heating and ventilating package, suitably controlled, to maintain constant humidity.

The schematic control diagram, Fig. 1, shows the listed controls in their relative operating locations. All pneumatic relays have been omitted from the diagram as their number and use will vary with the particular make of control instrument.

The sequence of operation is as follows: The humidistat H-1 mounted in the space will, on a rise in humidity above its setting, modulate the hot water valve V-1 closed to the bypass, thus bringing on more heating.

The proportion of return and outside air to the space is determined by the dewpoint controller DP-1 which has its sensing element in the mixture air stream ahead of the heating coil. The dewpoint controller is reset by the master outside air thermostat T-1 to maintain a mix-

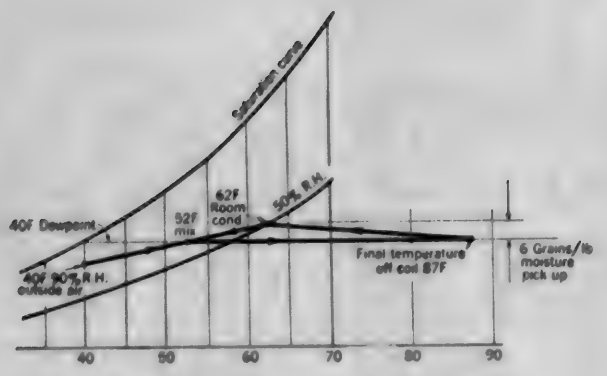

Fig. 2. Psychrometry at winter design conditions.

ture dewpoint temperature equal to the outside dry bulb temperature. Thus, as the mixture dewpoint temperature rises above the setting of the dewpoint controller this instrument will start modulating open the outside air and relief dampers and modulating closed the return air damper. When the temperature in the space reaches the setting of the room changeover thermostat T-2, this instrument will over-ride the dewpoint controller DP-1 and start to modulate open the outside air and relief dampers until they are fully open and the return air damper is fully closed.

On a rise in discharge temperature above the setting of the discharge high limit thermostat T-3 this instrument will modulate the hot water valve V-1 closed to the coil, thus reducing the heat output to the space.

On a drop in discharge temperature below the setting of the discharge low limit thermostat T-4 this instrument will modulate the hot water valve V-1 open to the coil, thus increasing the heat output to the space. The psychrometric situation under operating conditions will be shown by an example.

In the design of any system requiring a constant relative humidity the following conditions generally must first be established.

(1) Relative humidity to be maintained,
(2) Upper and lower discharge temperature limits,
(3) Air circulation volume rate,
(4) Thermal transmission of walls per degree F temperature difference,
(5) Moisture pickup in space, grains per pound dry air,
(6) Winter and summer design conditions.

Condition (2) will depend on the critical nature of the product being stored or manufactured, because the supply air entering the space will fluctuate between these limits.

Design Example

Once the listed conditions are established the actual design of the simplified system can be started. As an example of the system design, assume values for the conditions as follows:

(1) Relative humidity to be maintained	50%
(2) Upper and lower discharge temperature limits	55 and 110 F
(3) Air circulation volume rate	2000 cfm
(4) Thermal transmission per degree F	2500 Btu per hr
(5) Moisture pickup in grains per pound dry air	6
(6) Winter design temperature	40 F D.B.
(7) Summer design temperatures	95 F D.B. and 78 F W.B.

Since the space for this example is to be located in a 40 deg F winter design area, for illustrative purposes, then, we can assume the dry bulb at winter design conditions to be 40 F with the corresponding wet bulb varying anywhere on this dry bulb line. On the psychrometric chart, Fig. 2, at winter design conditions the outside relative humidity is shown at 90%. As previously described, the outside dry bulb temperature will automatically reset the dewpoint controller to set up a dewpoint temperature within the apparatus equal to the outside dry bulb. Thus, when the outside dry bulb is 40 F any mixture in the apparatus is maintained at 40 F dewpoint.

Winter Design Conditions

The indoor condition at peak moisture load has been established at 6 grains per pound dry air above that dewpoint. This condition of course will meet room design conditions on the 50% relative humidity line. These two coordinates determine the indoor space temperature that will be obtained when the outside air temperature is 40 F and the moisture load is at peak conditions. Fig. 2 indicates this point to be 62 F. The mixture condition is then found on the line joining inside and outside conditions at the point where it meets the 40 deg dewpoint coordinate. Mixture dry bulb is thus established at 52 F in Fig. 2. With inside temperature established we can now determine the total transmission loss, the final temperature off the heating coil, and the maximum heating capacity required.

The design temperature difference is $(62 - 40) = 22$ deg.

Multiplying this by the previously determined heat transmission rate we have the hourly transmission loss

$$q = 2500 \times 22 = 55{,}000 \text{ Btu per hr}$$

We may now solve for the final temperature off the coil, t_c:

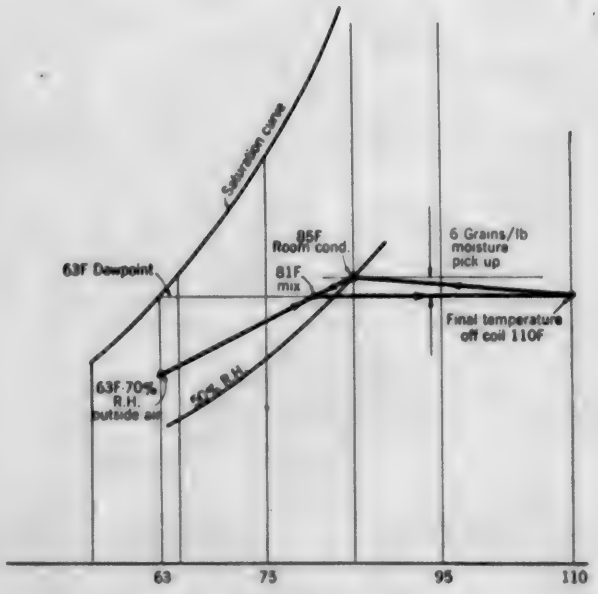

Fig. 3. Conditions at discharge high limit.

$$t_c = t_i + \frac{q}{1.08 \times cfm}$$

$$t_c = 62 + \frac{55{,}000}{1.08 \times 2000} = 87\ F$$

Where t_i is room temperature and the constant 1.08 converts cfm to Btu per (hr) (deg F).

Having the mixture temperature t_m from Fig. 2, the maximum heating capacity required Q can be determined by

$$Q = 1.08 \times cfm\ (t_c - t_m)$$

$$Q = 1.08 \times 2000\ (87-52) = 76{,}000\ Btu\ per\ hr$$

Discharge High Limit

The psychrometric sketch, Fig. 3, indicates the conditions that prevail when the discharge high limit is reached. Since the temperature difference between room and outside accommodates the 6-grain moisture gain and thus remains constant at 22 F until the discharge high limit is reached, it is a simple matter to determine the outside dry bulb temperature which will result in reaching the discharge high limit.

$$t_o = t_c - (t_i - t_o) - \frac{q}{1.08 \times cfm}$$

$$t_o = (110-22) - \frac{55{,}000}{1.08 \times 2000} = 63\ F$$

From these same relationships the setting of the room changeover thermostat (function of which in the cycle has been explained) can be determined.

$$t_i = t_c - \frac{q}{1.08 \times cfm}$$

$$t_i = 110 - \frac{55{,}000}{1.08 \times 2000} = 85\ F$$

It may be seen that the changeover point occurs when the discharge high limit temperature is first reached, and that the inside-outside temperature difference remains unchanged until this point is reached.

Summer Conditions

Fig. 4 shows the cycle of operation occurring when the system is functioning on 100% outside air, with room air above the room changeover point. The cycle of operation at summer design temperature is also indicated. As shown on the psychrometric chart, any final coil temperature occurring for indoor conditions above the room changeover point may be calculated as follows:

(1) The outside temperature and the room moisture load determine the indoor conditions on the choosen relative humidity line.

(2) Referring to Fig. 4; $t_o = 80$ F, $t_i = 88$ F, relative humidity to be maintained = 50%.

Therefore, transmission loss,

$$q = (t_o - t_i)\ 2500\ Btu\ per\ (hr)\ (deg\ F)$$

$$q = (88-80)\ 2500 = 20{,}000\ Btu\ per\ hr$$

and discharge temperature at coil,

$$t_c = t_i + \frac{q}{1.08 \times cfm}$$

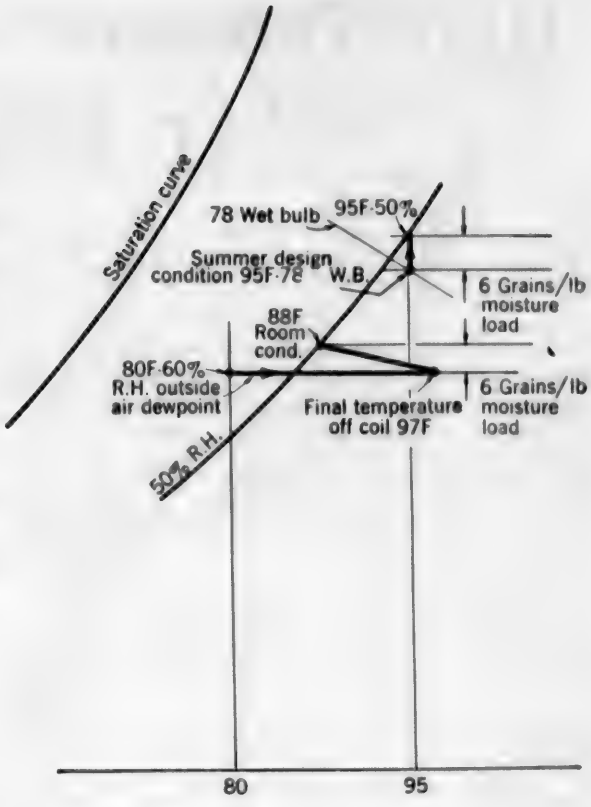

Fig. 4. Conditions requiring 100% outside air.

$$t_c = 88 + \frac{20{,}000}{1.08 \times 2000} = 97\ F$$

At summer design conditions (95 F D.B. and 78 W.B. outside) no heat is added to the mixture at the coil, no transmission heat loss occurs, and moisture pickup is handled by ventilation with 100% outside air as shown in Fig. 4.

It can be seen from a study of the psychrometric charts that the principle limitation of the simplified system occurs in very dry climates. If the outside temperature is above the changeover point and the accompanying outside relative humidity is lower than the design relative humidity the design conditions will not be met. For most cases, with the exception of the climatic extremes, the deviation obtained will be within the allowable tolerances as generally specified. Nevertheless, the outdoor climatic conditions should be checked and a careful analysis made before undergoing the final design of the system.

Since the operation of the system depends, in part, on the temperature differential between the space and the outside being maintained, some consideration should be given to the minimizing of solar heat gain. It is advisable to check the peak cooling load at summer design conditions. The reason for this is that the heat gain to the space should not at any time lower the discharge temperature to a value below that of the space temperature.

In conclusion, it can be seen that the system provides a unique solution to the problem of maintaining constant relative humidity conditions. The operation, maintenance, and first cost of the simplified system is also lower than that for a conventional system of comparable size.

High Temperature Psychrometric Chart for Humid Air

J. R. KAYSE

American Air Filter Co., Louisville, Ky.

In the design of systems for handling humid air at temperatures to 1,500 deg F, the accompanying chart and example of its use will greatly simplify calculations.

IN high temperature air handling, the effect of water vapor in an air stream has a substantial bearing on proper selection of exhauster size, speed and motor horsepower. It is especially important in systems including dryers, kilns, wet type dust collectors, or cooling chambers. The addition of water vapor in an air stream affects the density of the air in the same manner as increased temperature. The higher the temperature of a given weight of air, the greater the volume occupied by that weight. Of greater significance is the change in density of gases containing appreciable quantities of water vapor. With the lower density of water vapor as compared to dry air at the same temperature, a mixture will weigh considerably less per cubic foot than will dry air. True density of the air stream must be known before exhauster size, speed and motor horsepower can be properly determined.

The AAF Psychrometric Chart, Fig. 1, was drawn to enable anyone working with high temperature moisture laden air to easily determine the density or more important, the density factor of an air-vapor mixture for practically any condition that will be encountered. Without a chart of this type, true density or density factor can only be obtained by using standard psychrometric tables or charts and some involved arithmetic. The latter is necessary because air streams are seldom saturated and it is usually difficult to obtain a true wet bulb temperature especially in an air stream conveying dust particles.

In systems containing evaporative coolers or any device that will cause a change in the volume of air due to decrease in dry bulb temperature and corresponding increase in moisture content, the new volume can very easily be determined from the *before* and *after* humid volumes read directly on the chart.

Mechanics of Psychrometric Charts

In order to better understand the use of the chart, Fig. 1, or any psychrometric chart, a review of how it was composed is in order. In the following, any reference to standard air indicates dry air at 70 deg F and 29.92 inches of mercury, barometric pressure.

There are basically three variables on any psychrometric chart, namely, dry bulb, wet bulb, and dew point temperatures. If any two of the three are known, a point can be plotted on the chart to determine such values as total heat or enthalpy, humid volume, density factor, and specific humidity. Actually, if the dew point temperature is known, the specific humidity can be determined as it depends only on the dew point temperature of an air-vapor mixture. The values for total heat or enthalpy and humid volume on this chart are expressed in terms of Btu per pound of dry air and cubic feet of mixture per pound of dry air respectively.

The values shown for total heat, humid volume, and density factor can be determined arithmetically without reference to any psychrometric chart provided the dry bulb temperature, specific humidity and partial pressure of the water vapor in the air-vapor mixture are known. Total heat expressed in Btu per pound of dry air can be determined by the equation,

$$h = .24t + (1061 + .45t)w \qquad (1)$$

where t = dry bulb temperature, F
w = specific humidity, pounds of water vapor per pound of dry air, based on dew point temperature

The humid volumes shown in Fig. 1 are expressed in cubic feet per pound of dry air and are actually the apparent specific volumes. True specific volume, since it is expressed in cubic feet per pound of mixture, is used to compute the density of the air-vapor mixture and the density factor.

$$\text{Apparent specific volume} = 13.33\left(\frac{460+t}{530}\right) + 13.33\left(\frac{460+t}{530}\right)\left(\frac{(p)}{P-p}\right) \qquad (2)$$

13.33 = specific volume of dry air at standard conditions
t = dry bulb temperature, F
p = partial pressure of water vapor
P = standard atmosphere pressure

$$\text{True specific volume} = \frac{\text{apparent specific volume}}{1+w} \qquad (3)$$

w = specific humidity, pounds of water vapor per pound of dry air

$$\text{Density of air stream} = \frac{1}{\text{true specific volume}} \qquad (4)$$

$$\text{Density factor} = \frac{\text{density of air stream}}{\text{density of standard air}} = \frac{\text{density of air stream}}{.075} \qquad (5)$$

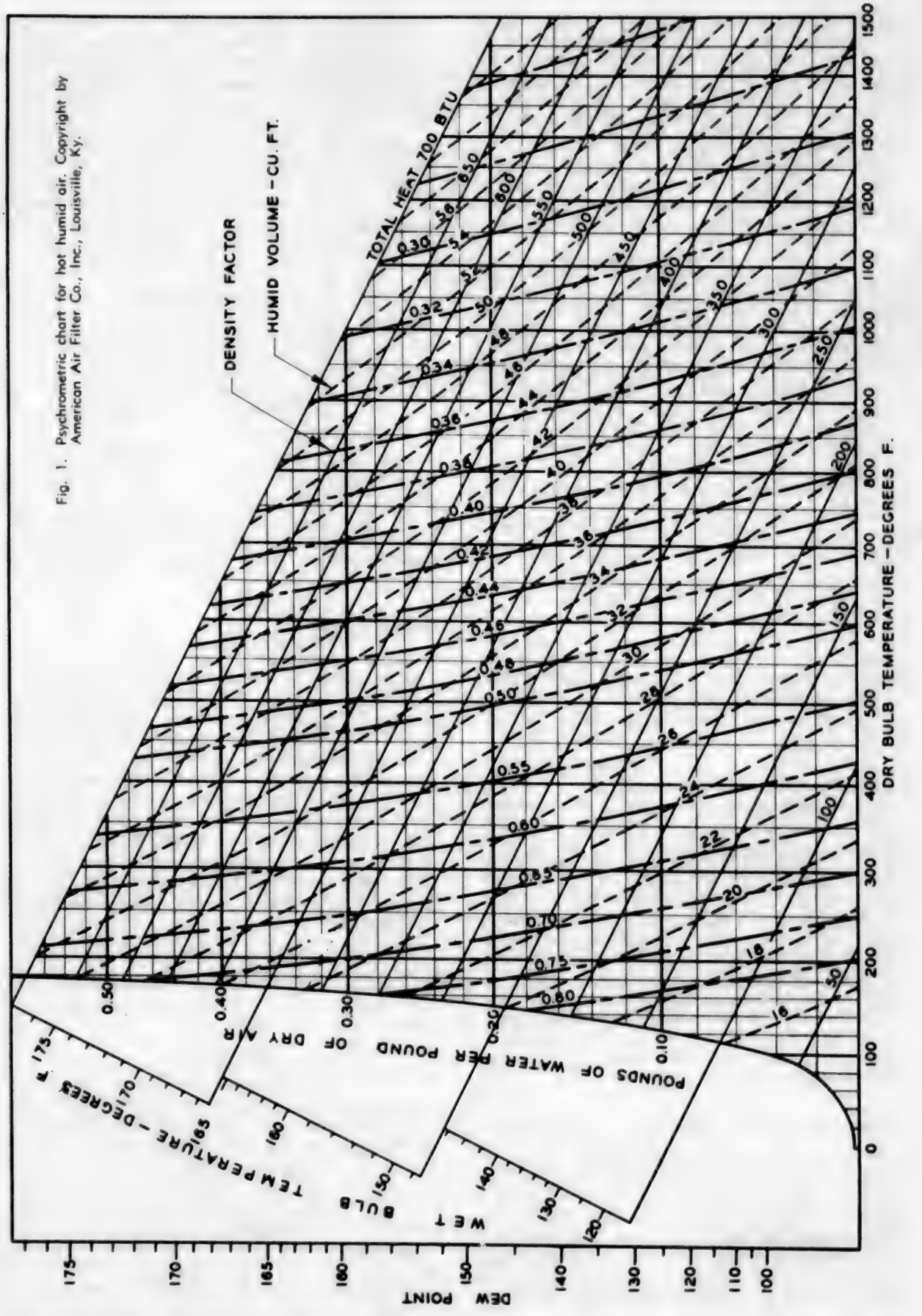
DENSITY FACTOR
HUMID VOLUME – CU. FT.
TOTAL HEAT 700 BTU
DRY BULB TEMPERATURE – DEGREES F.
POUNDS OF WATER PER POUND OF DRY AIR
WET BULB TEMPERATURE – DEGREES F
DEW POINT

Fig. 1. Psychrometric chart for hot humid air. Copyright by American Air Filter Co., Inc., Louisville, Ky.

After obtaining the needed information from the chart, the correct way of applying the factors found should be known. In an air-vapor mixture, the density will be different from that of standard air and consequently a density factor should be applied to the volume of air and the static or total pressure to be developed by the exhauster before proper selection can be made.

If the volume required is expressed in terms of standard air and operating conditions are different, the volume should be divided by the density factor to obtain the actual volume required of the exhauster.

$$\text{CFM (required)} = \frac{\text{SCFM}}{\text{density factor}} \qquad (6)$$

SCFM = air volume at standard conditions

Any changes in volume due to cooling or heating can be determined by multiplying the existing volume by the ratio of new humid volume over existing humid volume.

$$\text{CFM}_1 \times \frac{V_2}{V_1} = \text{CFM}_2 \qquad (7)$$

V_2 = existing humid volume, cubic feet per pound of dry air

V_1 = new humid volume, cubic feet per pound of dry air

When static or total pressure is expressed in terms of operating conditions, it is necessary to know what the pressure would be if standard air were being exhausted. This conversion is necessary, before exhauster speed and horsepower required can be determined, as standard exhauster performance tables are usually based on standard air. A pressure expressed in terms of operating conditions should be divided by the density factor to obtain an equivalent pressure for standard conditions.

$$\text{Pressure (standard conditions)} = \frac{\text{Pressure (required)}}{\text{density factor}} \qquad (8)$$

After obtaining the actual volume to be exhausted at operating conditions and the pressure to be developed in terms of standard conditions from the above calculations, the exhauster speed and horsepower required can be found. Since volume is a direct function of exhauster speed, the rpm read from the fan performance table is used because it was selected for the volume actually required. The brake horsepower, as read from the table, is for standard air and consequently is higher than necessary for less dense air. Actual horsepower required is obtained by multiplying the BHP obtained from the performance tables by the density factor.

$$\text{BHP (required)} = \text{BHP (from tables)} \times \text{density factor} \qquad (9)$$

Where evaporative coolers are included in the air stream, it is necessary to know the humidifying efficiency before the outlet conditions can be determined; or, if a known outlet condition is desired, it is necessary to compute the humidifying efficiency required. The humidifying process through an evaporative cooler is not truly adiabatic though for practical purposes it can be assumed as such. In addition to the sensible-latent heat exchange between the air and water, heat is also given up to the surroundings through the housing of the chamber. This latter loss, however, is so slight as to be negligible since it is beyond the accuracy range of the usual field measuring equipment. Humidifying efficiency is sometimes defined in low temperature work as the ratio of the actual dry bulb depression to that which would obtain at adiabatic saturation. This definition is not applicable at elevated temperatures, and humidifying efficiency is defined as the ratio of the actual moisture gain through the machine to the moisture gain required to adiabatically saturate the air. By equation, this definition may be written as

$$N_h = \frac{W_2 - W_1}{W_s - W_1} \times 100 \qquad (10)$$

N_h = humidifying efficiency, percent

W_1 = weight of water vapor of inlet air

W_2 = weight of water vapor of outlet air

W_s = weight of water vapor of inlet air after adiabatic saturation

Substituting the known values in the above equation, either humidifying efficiency (N_h) or outlet specific humidity (W_2), whichever is required, can be determined.

The proper use of the AAF High Temperature Psychrometric Chart and subsequent correct solution of exhauster speed and motor horsepower are shown in the following example.

Example Problem

The exit volume from a dryer is 35,000 cfm of moisture laden air at 600 deg F. The dryer has a feed rate of 60 tons per hour of material containing 15% moisture. The material leaving the dryer contains 5% moisture. The required static pressure on the dryer is 2.0 inches w.g. at operating conditions. The exhaust system has a dry centrifugal dust collector with a 3.0 inches w.g. pressure drop at standard conditions and the calculated duct loss is 2.0 inches w.g. at standard condition. With the exhauster discharging directly to the atmosphere, determine exhauster speed and motor horsepower required.

To properly determine the density factor, it is necessary to know the specific humidity before using the psychrometric chart.

(1) Amount of moisture released by dryer is:

$$\frac{60 \text{ Tons/hr} \times 2000 \text{ lb/Ton} \times (15\% - 5\%)}{60 \text{ min/hr}} =$$

200 lb water vapor per minute

(2) Reference to a psychrometric table indicates that water vapor at 600 deg F has a specific volume of 42.8 cu ft per pound or it can be determined by:

$$\frac{386}{\text{molecular wt of water}} \times \left(\frac{460 + t}{460 + 70}\right) = \frac{386}{18} \times \left(\frac{460 + 600}{460 + 70}\right) = 42.8 \text{ cu ft per lb}$$

(3) Volume of water vapor = 42.8 cu ft per lb × 200 lb per min = 8560 cfm

(4) Volume of dry air = Volume of mixture minus volume of water vapor
= 35,000 cfm − 8560 cfm
= 26,440 cfm

(5) From psychrometric tables, the specific volume of dry air at 600 deg is 26.7 cu ft per lb or it can be determined arithmetically by

$$\frac{386}{\text{mol wgt}} \times \left(\frac{460 + t}{460 + 70}\right) = \frac{386}{29} \times \left(\frac{460 + 600}{460 + 70}\right)$$

= 26.7 cu ft per lb

(6) Pounds of dry air in the system = $\frac{26{,}440 \text{ cfm}}{26.7 \text{ cu ft/lb}}$ =

990 lb per min

(7) Specific humidity = $\frac{200 \text{ lb of water vapor}}{990 \text{ lb of dry air}}$ =

.202 lb of vapor/lb dry air

(8) Knowing the specific humidity and dry bulb temperature, reference to the psychrometric chart indicates a condition at point W_1 (see Fig. 2) where

humid volume = 35.5 cu ft per lb of dry air
density factor = .455

(9) Pressure loss through the system at standard conditions is:

Dryer loss = $\frac{2.0}{.455}$ = 4.4 (Equation 8)

Dust Collector loss = 3.0
Duct loss = 2.0
Total = 9.4 inches w.g.

(10) Assuming the velocity pressures on the inlet and outlet of the exhauster are equal, the summation of the above values gives the total pressure of the system. As most exhauster performance tables are expressed in static pressure, it is necessary to subtract the fan inlet velocity pressure. This will be assumed as 1.0 inch w.g., therefore, the exhauster performance will be selected for 35,000 cfm at 8.4 inches w.g.

RPM = 720
BHP = 77.5

(11) The actual horsepower required equals

77.5 × .455 = BHP (Equation 9)

Extending the example problem by including an evaporative cooler and fabric dust collector in the system will demonstrate even further the importance of knowing the correct density factor for proper exhauster selection. With the exhauster located on the air leaving side of the fabric collector and discharging to the atmosphere, the cooling chamber having a pressure drop of 1.0 inch w.g. at standard conditions, the fabric collector a 3.0 inches w.g. pressure drop at standard conditions, and the air leaving the cooling chamber at 200 deg, determine the correct exhauster speed, motor horsepower, humidifying efficiency required in the cooling chamber and amount of water evaporated.

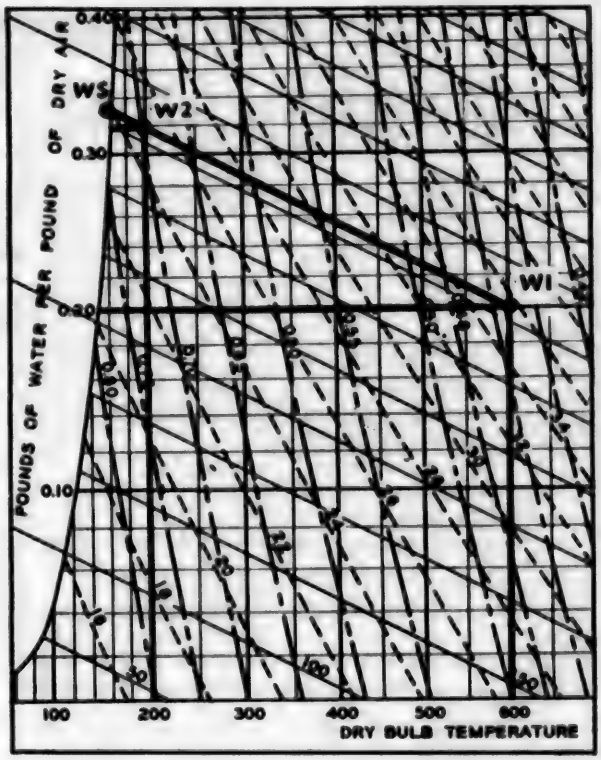

Fig. 2. Section of chart showing example.

(1) The inlet condition has already been plotted as point W_1 on the chart (Fig. 2). Now a line following a constant wet bulb temperature for adiabatic saturation should be drawn to the saturation curve. Reference to the chart indicates a W_s of .33 pounds of water vapor per pound of dry air. Following the vertical line for a dry bulb temperature of 200 deg, it can be seen that the intersection of this vertical line with the constant wet bulb line is at a point designated by W_2. Point W_2 indicates the outlet condition from the cooling chamber with the air stream containing .32 lb of vapor per lb of dry air. Substituting the values for W_s, W_2, and W_1 in Equation (10), the humidifying efficiency necessary in the cooling chamber is:

$$N_h = \frac{W_2 - W_1}{W_s - W_1} = \frac{.32 - .20}{.33 - .20} = 92.3\%$$

(2) Reference to the point on the chart indicated by W_2 shows
humid volume = 25.2 cu ft per lb of dry air
density factor = .70

(3) Amount of water evaporated in the cooling chamber will be: $(W_2 - W_1)$ × pounds of dry air = (.32 − .20) × 990 = lb per min

(4) The volume of air in the system after passing

through the evaporative cooler can be found by using Equation (7):

$$CFM_1 \times \frac{V_2}{V_1} = 35{,}000 \times \frac{25.2}{35.5} = 24{,}800 \text{ cfm}$$

(5) The presure loss in the system corrected to standard condition is:

$$\text{Dryer loss} = \frac{2.0}{.70} = 2.9 \qquad \text{(Equation 8)}$$

Dust Collecter loss	= 3.0
Duct loss	= 2.0
Cooling chamber loss	= 1.0
Fabric collector loss	= 3.0
Total	= 11.9 inches w.g.

(6) Subtracting 1 VP at the fan inlet, the exhauster will be selected for 24,800 cfm at 10.9 inches w.g.

RPM = 868
BHP = 62.5

(7) Actual horsepower required =
$62.5 \times .70 = 43.8$ hp (Equation 9)

In this example, if only temperature reduction is considered without computing the effect on density by the addition of water vapor, an exhauster would be selected for 21,800 cfm at 10.5 inches w.g. which requires 843 rpm and a motor selected for 42.6 hp. This represents an error of 12% in volume, 4% in static pressure, 3% in exhauster speed, and 3% in horsepower required.

Conclusions

The example illustrates the importance of considering the effect of water vapor in an air stream and also the ease in which the psychrometric chart can be used for taking this water vapor into consideration. There are many other advantages in its use, namely, in the above example, the outlet temperature from the cooling chamber was made a constant and the humidifying efficiency was determined. If wet type dust collectors are used in an exhaust system employing high temperature air, it is very easy to predict the outlet temperature and volume from the unit if the humidifying efficiency is known. Knowing only two variables, dry bulb temperature and specific humidity or dew point temperature, enables anyone with the use of the psychrometric chart to accurately and easily find the proper density factor, humid volume, and wet bulb temperature; all of which can be important for proper exhauster selection when working with moist, high temperature air.

Acknowledgment: The author wishes to acknowledge the work of Mr. Stig Sylvan, director of research, American Air Filter Company, Inc., who compiled the chart used in this article.

Thermal Barrier, Next Obstacle in Flight

Since breaking the sound barrier in flight is a relatively common occurrence now, General Electric engineers are looking at the problem of hurdling the thermal barrier, man's next obstacle in the conquest of space.

Writing in the company's engineering and scientific publication, the General Electric Review, J. S. Alford and E. L. Auyer explain how speeds of 1500 miles per hour and above create problems of extreme heat caused by the friction of planes hurtling through air.

At the official world's speed record which is approximately 750 miles per hour, the temperature caused by air ramming against the plane is approximately 100 deg F.

This is welcome heat where the air is cold and the temperature rise can contribute toward solving the cabin-heating problem, but for summer and tropical flight, some form of cabin and cockpit refrigeration is required.

This refrigeration can be accomplished for speeds near 750 miles per hour. However, the ram temperature goes up with the square of the flight speed. For example, at 1500 mph the temperature rise would be 400 deg F, or hot enough to cook the pilot and soften parts of the aircraft.

The engineers point out that this is a critical problem in the building of jet engines. At three times the speed of sound (Mach 3), the air ramming into the jet engine inlet might be about 650 deg, or hot enough to melt lead. In addition, for efficient operation of the jet engine, this air would have to be heated further in the combustion chambers of the jet to approximately 1600 deg and would exhaust through an afterburner at over 3500 deg. Steel melts at 2600 deg.

Mechanical strength and physical properties of metals decrease substantially at higher temperatures, so new metals and cooling methods are under consideration for flights of 1500 mph and up.

Mr. Alford and Mr. Auyer explain that new high-thrust engines will have to be relatively light-weight, highly efficient, and have a high thrust rating per pound of weight and per unit of frontal area. Therefore, size is extremely important. Theoretically, the thrust rating of a jet engine can be increased four times by doubling the size of the engine. This sounds like the logical solution for more thrust except that the weight of this engine would have increased eight times.

These are some of the problems of supersonic flight which are under consideration at the General Electric Company's Aircraft Gas Turbine Division. G-E engineers are optimistic about the future and foresee the day when the thermal barrier will be no more of a problem than the once formidable sound barrier. It is in this supersonic speed range where jet engines really show their effectiveness, they say.

FIELD SURVEY SHOWS BIG-BUILDING OWNERS ARE READY FOR

ENGINEERED AIR CONDITIONING

THOMAS HANCOCK

Executive Vice President, The Trane Co., La Crosse, Wis.

Here is a rundown on the attitudes of owners and managers of large commercial buildings as revealed through hundreds of conversations with both sales and reporting personnel. Next to painting, air conditioning ranks second on a long list of must items for modernization, and the piecemeal compromise is increasingly recognized as a poor substitute for engineering with a master plan.

OWNERS of America's large office buildings today are more eager to talk air conditioning with the consulting engineer than they ever have been before. They're beginning to discover the costly folly of unplanned installation of air conditioning equipment by bits and pieces as so many of them have done since World War II to meet emergencies of tenant demand. By contrast, they are finding that with planned air conditioning they can increase the occupancy rate of their buildings, and get more revenue from the occupied space.

The result is that today, building owners are more ready than ever to listen to the engineer suggest over-all programs for air conditioning their buildings.

With the air conditioning of existing large buildings such as office buildings and hotels promising to be one of the most spectacular opportunities for this industry during the next 10 years, it's useful business ammunition for the engineer to know how building owners and managers are thinking about this problem today . . . and what they're doing about it.

Information gathered by The Trane Company from many sources including field surveys shows the seriousness with which big-building owners are now tackling air conditioning, and why.

Highlights

Here are a few of the highlights of significant facts:

On their list of things to buy, owners and managers of large commercial office buildings today are placing air conditioning second only to paints. In a national survey by a leading management magazine, they listed 54 items of modernization and maintenance they expected to buy during the next 12 months, ranging from paints to mop wagons, window shades to bird repellent devices. The normal maintenance item of paints led with 61.5% —but right on its heels was air conditioning, named by 55.9%.

In another survey 86% reported that they were experiencing growing demand from tenants for air conditioning. Sixty-six percent said they must air condition *now* in order to keep their buildings competitive.

Today a number of key northern cities which once felt they were naturally air conditioned seem to be setting out to overtake the southern cities which have been more generally air conditioned for years because of warmer climate.

Competition of new post-war buildings, fully air conditioned, is contributing to the speed-up of plans to modernize existing structures. Climbing vacancies in many cities are making owners think more and more about adding the tenant attraction of air conditioned space. Such modernization enables owners to charge higher rents; it is common to increase rentals approximately $1 per square foot per year upon air conditioning.

One of the most important factors of all is that many owners see modernization as their best defense against a development they fear the most—over-construction. The Trane surveys highlight the fact that over-building of commercial office space is as frightening to a building manager as over-building of plant capacity is to a manufacturer—perhaps even more so.

As a result, many owners are convinced—as one spokesman puts it—that "the only sensible curb we can place on over-building is through keeping our older buildings in the running as long as possible through attractive and comfortable modernization." And, he emphasized, modernization primarily means air conditioning.

Capital investment for modernization, he stressed, is justified by the $10-per-square-foot difference in cost between the new $25-per-square-foot building and the one erected some years ago for $15. "The increase in rentals secured," he said, "will more than pay fixed charges and amortization of the cost of modernization."

To the consulting engineer, it is important business knowledge to realize that owners and managers of large existing buildings frequently echo such statements—and, increasingly, are offering more than lip service by actually undertaking building-wide air conditioning.

Even in New York City, with a vacancy of only about 1% in prime office space, the air conditioning of existing buildings is speeding up.

Construction of 54 new and fully air conditioned buildings in Manhattan since World War II has injected a new competitive factor into the office situation there. Partly because of this competition, partly because air conditioning is so clearly the trend of the times, numerous existing buildings are installing air conditioning systems.

Out of 339 existing major office buildings surveyed in 1954 by the Real Estate Board of New York, Inc., 14 had been fully air conditioned with central systems installed by the building, and 66 had been partially air conditioned. The latter includes both complete building-installed systems extending over a portion of the structure,

and building-installed chilled water systems to which tenants may connect their own equipment.

Philadelphia is modernizing at an even faster rate. As of January 1, 1955, a total of 13 rental office buildings in the central downtown area had already been fully air conditioned with central installations, and air conditioning systems were being installed in two more buildings representing a total of about 37% of the net rentable area of comparable structures.

Other pending projects are expected to bring the figure to about 40% by the beginning of this cooling season. Some estimate that as much as 53% of Philadelphia office space will have been conditioned by this summer. Several of the major Philadelphia office building managers agree that 75% of the office space in the city will have been conditioned within five years.

No Slow Starters

And in cities where the air conditioning movement has not yet taken hold—Cleveland, for example—office building managers say that "when you encounter a situation like that in Philadelphia, it behooves building owners to modernize to hold tenants."

Surveys to date show most owners agree that all it takes is a *single* outstanding example of a large building, fully air conditioned, to start competitive structures in the same area on the air conditioned road.

Building-wide air conditioning programs have been rolling along in Pittsburgh, gaining speed in such cities as Cincinnati, Chicago, Minneapolis. They have gained headway in cities where building managers used to say: "We hardly need air conditioning here; we have only a few really hot days a summer." But when the tenants demand it, they know they must keep their tenants happy.

In New York, an official of one of the largest management firms told The Trane Company: "If you want your building to produce as much revenue as it possibly can, you *must* have air conditioning."

In Chicago, a key management executive agreed: "Here, you have got to have air conditioning to stay in a competitive position."

They are beginning, more and more, to talk like the Atlanta building executive who said: "In the next five years, the building that is not air conditioned will be obsolete—and its renting will reflect it."

Some managers tell Trane they are just beginning to feel the competitive need for air conditioning that America's storekeepers have felt for years. While they see the developing competition from new buildings, they also point out that their own structures often have more choice locations and "prestige" addresses. And they add that with modernization they can keep desirable tenants and get the higher rents which air conditioning justifies. In effect, they are making their choices today between modernization at a profit and obsolescence at a loss.

When vacancies start climbing, managers heed the trends. In Philadelphia, vacancies have climbed 2% during the last year to 4.56%, and by the time the new 440,000-square-foot Penn Center building is open for business, vacancies are expected to reach the 10% once considered normal.

In Minneapolis, vacancies have increased from a low of 0.4% on October 31, 1946, to 3.84% on October 31, 1954, and, building representatives believe, may reach 9 or 10% largely due to new construction headed by the new Prudential Insurance building, a fully air conditioned structure of 293,000 square feet. In other cities, too, vacancies are increasing at varying rates—but enough to portend a genuine scratching for business.

Owners are eager for help. Yet, in recent years, too many of them have been turning for help to each other—to their fellow laymen—instead of to the engineer. In general, however, surveys show the engineer's suggestions are going to get a more sympathetic audience today than they would have a few years ago—because the situation has been changing.

"This air conditioning thing," as one manager put it, "just kept creeping up on us. We became aware of it only gradually as we had to put in new electrical capacity here, new water services there, to satisfy tenants who wanted to put in their own equipment."

In this way, many buildings have put in a patchwork of systems—always on an emergency, temporizing basis. And a lot of the owners are unhappy about that. They are now ready for the engineer's explanation that piecemeal systems can't be expected to do the best air conditioning job and—if extended throughout the building—may even cost more in toto than a system carefully engineered from the outset.

Many of them know these piecework systems seldom, if ever, fit into an over-all system when time comes for expansion. Most of them have heard how one large Philadelphia building, after air conditioning, had to work out a formula to buy back from tenants air conditioning equipment with a total capacity of some 330 tons! They don't want that to happen in their buildings. They have troubles enough.

Can Proceed by Stages

So today—if a building owner boggles at the cost of an over-all air conditioning system which may run into six or seven figures—the engineer may find him very receptive to the idea of conducting a study of the building's needs and preparing a program under which installation can proceed by stages, over a period of several years.

He may more readily heed suggestions—if the engineer deems it advisable—to prepare such a long-range installation program for the entire building now, even if he doesn't plan on starting to put it into effect for two or three years.

In fact, The Trane Company, in talking to big-building owners, is consistently urging them to enlist the aid of their own or independent consulting mechanical engineers to approach their air conditioning programs on a sound, engineered basis.

Only the engineer on the firing line can decide the business tactics of dealing with any individual building owner, just as only the engineer can decide what the best system is for any particular building.

One of New York's top building-management men made this statement: "Unless a building manager has thoroughly analyzed his requirements for air conditioning, he simply isn't doing his job."

The building manager's ready to listen to whatever the engineer suggests.

Evaporative Cooling in Humid Areas

GERALD L. SCHWARZ

Consulting Engineer, Cleveland Heights, Ohio

Many areas which are considered by some engineers to be unsuitable for evaporative cooling may be found adaptable when 6-hourly Weather Bureau records are studied.

THE idea that evaporative cooling is suitable only for the dry sections of the country is one of the most widespread fallacies in the field of air conditioning. Inadequate installations based on dry climate practice, local beliefs about humidity conditions, and poor installations in the comparatively few areas which are actually not suitable for evaporative cooling, have fostered this misconception.

The facts are, as proven by many excellent installations, that in regions with design wet bulb temperatures up to 78 deg F evaporative cooling can be effective.

(1) In highly humid spaces such as laundries and dry cleaners. These have been one of the most successful types of installations.
(2) In some establishments using drying processes. These include printing and paper box factories.
(3) In taverns, open kitchens, beauty parlors, ballrooms and similar places with high ventilation loads.
(4) In foundries and factories requiring spot cooling.

An excellent example of the fallacy of using design wet bulb temperatures as a limiting criterion is demonstrated by comparing results in Miami, Florida and Davenport, Iowa. Miami, which is a very unsuitable spot for evaporative cooling, has a design wet bulb of 79 deg as compared with the 78 deg in Davenport, Iowa where the Aluminum Company of America has an excellent installation in their re-melt furnace building.

Most of the writer's personal experience is centered in the lower Great Lakes Region which has a design wet bulb of 75 deg. There, evaporative cooling, until recently, has had a very poor reputation. Yet the wet bulb is one degree less than that of Phoenix, Arizona, where evaporative cooling has long been acknowledged as an excellent method.

The answer to the question of whether or not evaporative cooling is suitable for any given area can be found in a ten cent U. S. Weather Bureau Report, "Local Climatological Data." These reports are available for each month for most cities in the country. They show dry and wet bulb temperatures and relative humidities at six hour intervals for each day. Monthly averages are also given but these should not be used because they might lead to false conclusions as Table 1 will demonstrate.

The wet and dry bulb temperatures and relative humidity figures in Table 1 were taken from the Cleveland, O. Local Climatological Reports distributed by the U. S. Weather Bureau in Cleveland. The 1:00 p.m. figures were selected because they were the highest of the four recorded daily readings. Dry bulb temperatures less than 80 deg were omitted. August, 1953 was selected because there was a 10-day period with temperatures above 90 and because there was an opportunity to examine a number of evaporative cooling installations at 1:00 p.m., the time of day shown on the Weather Bureau Report.

Wet and dry bulb temperatures taken at each installation were reasonably close to those shown on the weather report. Wet and dry bulb temperatures at the outlets of the evaporative coolers were also taken. The 70% average efficiency used in arriving at evaporative cooler outlet dry bulb temperatures (column headed D.B.—70% W.B. in Table 1) was determined by these readings.

The effective temperatures in Table 1 were taken from an ASHAE effective temperature chart.

TABLE 1—DRY BULB AND WET BULB TEMPERATURES AT 1:00 P.M. IN CLEVELAND, OHIO

(With index to feasibility of evaporative cooling)

Date		Dry Bulb, F	Wet Bulb, F	Wet Bulb Dep.	D.B.—70% W.B.D.*	% R.H.	For Air Velocities, FPM		
							100	300	500
							Effective Temperatures		
Aug.	1	82	71	11	74.3	58	71	68	65
	3	82	71	11	74.3	58	71	68	65
	4	88	77	11	80.3	59	77	75	72
	6	82	66	16	70.8	43	68	64	61
	7	80	68	12	71.6	53	68	65	61
	11	81	66	15	70.5	44	67	64	60
	12	84	68	16	72.8	45	69	66	62
	13	86	73	13	76.9	55	74	71	67
	14	86	68	18	73.6	38	70	66	64
	20	80	64	16	68.8	43	65	61	59
	21	87	66	21	72.3	33	68	65	62
	22	84	66	18	71.6	38	68	64	62
	23	84	67	17	72.1	43	68	65	62
	24	84	69	15	73.5	47	70	67	64
	25	86	65	21	71.3	31	67	64	61
	26	90	67	23	73.9	30	70	67	64
	27	92	69	23	75.9	32	71	68	66
	28	90	68	22	74.6	33	70	67	65
	29	94	67	27	75.1	24	70	67	65
	30	94	70	24	77.2	30	72	70	68
	31	96	77	19	82.7	43	79	76	74
Sept.	1	95	74	21	80.3	37	76	73	71
	2	98	75	23	81.9	34	77	75	73
	3	98	73	25	80.5	30	75	73	71
	4	92	73	19	78.7	41	75	72	70

*Probable outlet dry bulb of an evaporative cooler.

Gerald L. Schwarz, formerly chief engineer of Air Controls, Inc. is a recognized authority on evaporative cooling systems and has a background of 24 years in the design and application of air handling equipment. He is a partner with his brother, R. H. Schwarz as engineering consultants specializing in cooling and ventilating laundries, foundries, smelters and industrial plants. He is a member of the National Society of Professional Engineers and was a member of the Blower Mfr's. Research Committee at The University of Illinois. He attended Case Institute of Technology, holds a number of patents on air handling equipment and has had 5 articles published in technical journals.

The effective temperature chart extends to only 700 fpm velocity, while velocities up to 1000 fpm were found satisfactory for spot cooling for steam pressers and ironers in laundries, forge tenders, and similar types of workers. For this study 500 fpm was selected because it will be seen that on the two 98 deg days effective temperatures as low as 71 and 73 were reached.

Satisfactory commercial installations were found when the following conditions were met:

(1) A minimum air change period of 1½ minutes;
(2) A minimum cross section velocity of 100 fpm;
(3) A maximum air throw of 50 ft;
(4) Ample exhaust facilities, i.e. exhausting the air at the same rate it is being introduced;
(5) 100% ventilation. The cooled air is not allowed to recirculate. Units are so installed as to use 100% outside air.
(6) Humidistat control provided for the water spray.

Industrial applications were satisfactory when:

(1) Flexible spot cooling ducts and registers were provided. Flexible means controllable by the workers being served. A system is most satisfactory when the worker can adjust the air velocity and direction to suit himself.
(2) Sufficient outlet velocities are available. Some typical examples are
   a. Laundry steam presser supplied with 1000 fpm air from a 12-inch round duct two feet from worker. This should be directed to blow the steam *away* from the worker and must be flexible for position and volume adjustment by the worker.
   b. Target velocity of 600 fpm was satisfactory for men working at forge furnaces when the air flow covered the men completely.
(3) Up to a 45-second air change is provided when complete coverage of exceptionally hot locations is desired.

Water and power requirements for evaporative coolers are small. For example, a unit that will deliver 12,000 cfm will use only 2⅓ hp motors and approximately 12 gallons of water per hour.

It can be surmised from the preceding facts that evaporative cooling can be successfully used for conditions of high heat loads or high ventilation requirements. Where peak loads are encountered for relatively short periods of time, such as meeting halls or funeral parlors, this type of cooling is practical and economical.

It is not to be construed that evaporative cooling is a substitute or replacement for mechanical refrigeration. It is not! Evaporative cooling finds application where conditions of heat or ventilation are such that other types of cooling are economically impractical.

Multiple Water Heaters Serve School for Girls

How do you go about meeting the exacting domestic hot water demands of 100 school girls living away from home? The Marycrest School for Girls, a boarding school operated by the Sisters of the Good Shepherd, faced that problem for its new dormitory building in Independence, Ohio, a suburb of Cleveland.

Tempered general-purpose hot water was required for 14 showers, 14 tubs, and 68 sinks in dormitory and private lavatories and for the taps in the school kitchen. Also, general-purpose hot water was needed for one domestic-type automatic clothes-washer in each of the six dormitory sections, where the girls launder small items of clothing. Higher temperature hot water was needed for an automatic dishwasher in the kitchen and for three commercial-type laundry machines in the school laundry, where the bulk of the clothing is washed.

Recognizing that a high recovery system was vital to meet this volume water demand, George F. Evans, Cleveland mechanical engineer on the job, first considered installing a single multi-coil water heater in the newly-built dormitories and connecting it to a big elevated storage tank.

Further investigation convinced him, however, that important advantages would be gained by installing six automatic gas water heaters. Operating in series and using the same cold water feed, each of these units contains a 67-gallon Monel tank. The six individual tanks provide the equivalent capacity of a single 400-gallon storage tank. Multiple water heaters could be installed more economically and also made possible the supplying of a two-temperature hot water service.

Accordingly, Mr. Evans specified and had installed six water heaters made by Ruud Manufacturing Company.

From the six water heaters, using natural gas, 180-degree water is mechanically circulated through insulated piping to the three laundry machines in the laundry room and to the automatic dishwasher in the kitchen. A tempered hot water line goes upstairs to the general washing facilities and the domestic automatic washers and also to the kitchen sinks and the laundry trays.

In addition to the storage capacity of the six Monel tanks, there is an additional recovery capacity of 370 gallons of 180-degree water heated even when very cold water enters the heaters.

Thus the maximum peak hour supply is 770 gallons of 180-degree water or 925 gallons of 140-degree water, which is considered more than enough to furnish both the high-temperature needs of the automatic dishwasher, plus mixed hot and cold water for ordinary domestic use during meal periods.

AIR CONDITIONING, HEATING AND VENTILATING'S

Reference Section

Service Piping and Its Equipment for Multistory Laboratories

Including pointers on how piping should be installed and the selection of pipe material for specific fluids

J. E. YORK

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Service Piping and its Equipment for Multistory Laboratories

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The arrangement of service piping and auxiliary equipment for the required services in multistory laboratories is an important consideraton in regard to first cost, appearance and economical operation. This article is a general presentation of the subject to assist engineers interested in the design and construction of new laboratories. Incuded are pointers on how the piping should be installed, and the pipe materials most suitable for transporting specific liquids and gases.

WHEN planning a multistory laboratory, it is advisable to consider the services required for the operation of the laboratory while the design of the building is in the preliminary stage.

An engineer who is familiar with this type of work, together with an architect, should be consulted when the general features of the building are discussed. The scope and purpose of the entire laboratory must be thoroughly understood, and the technical requirements of each laboratory should be discussed with the men directly responsible for their operation. The viewpoint of the owner in regard to the relative importance of appearance, cost of construction, probabilities of future changes and ease of maintenance should be understood. These points are all important.

The division of responsibility between the architect and engineer in providing a building of suitable construction, with a satisfactory arrangement of rooms, laboratory equipment and services should be established, and a committee, or an individual should be appointed to represent the owner in all discussions regarding the scope and cost of the work.

Appearance

Piping, whether exposed or not, is an important factor in the appearance of a laboratory. The type of work done in some laboratories makes exposed piping undesirable, but in other laboratories, when properly arranged, it adds to, rather than detracts from, the appearance. Laboratories requiring frequent changes in equipment and piping necessitate exposed piping. In all cases, however, effective appearance is the result of careful planning and installation.

Methods of Distribution

In a multistory laboratory, either horizontal or vertical

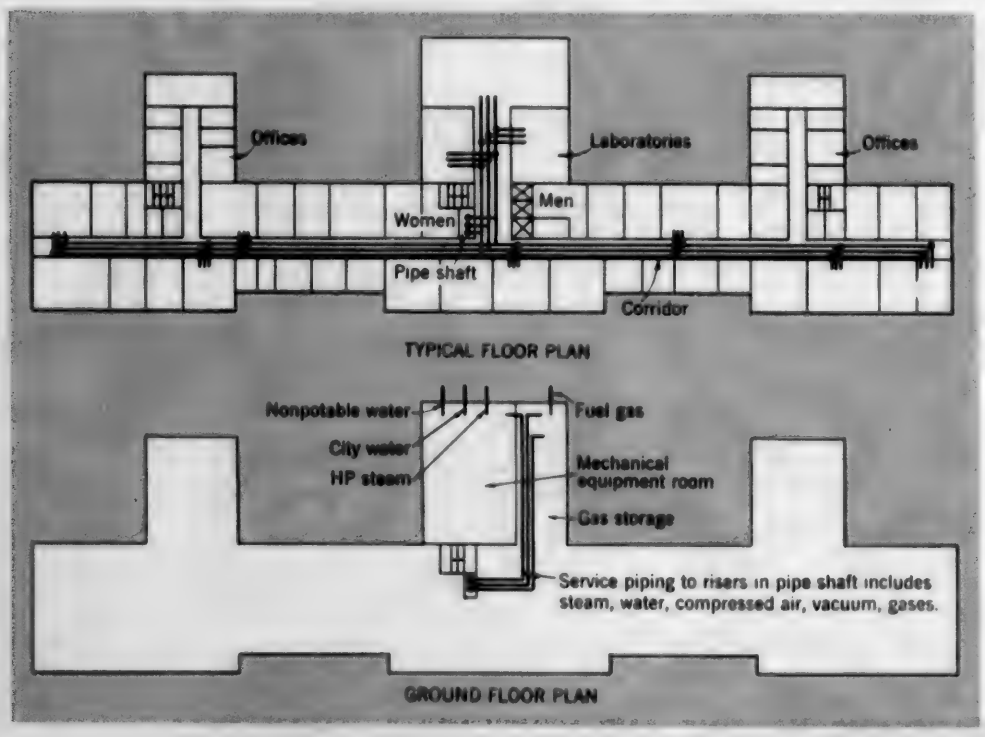


Fig. 1. Horizontal distribution system with risers in pipe shaft. Also shown are horizontal corridor mains and branches to laboratories.

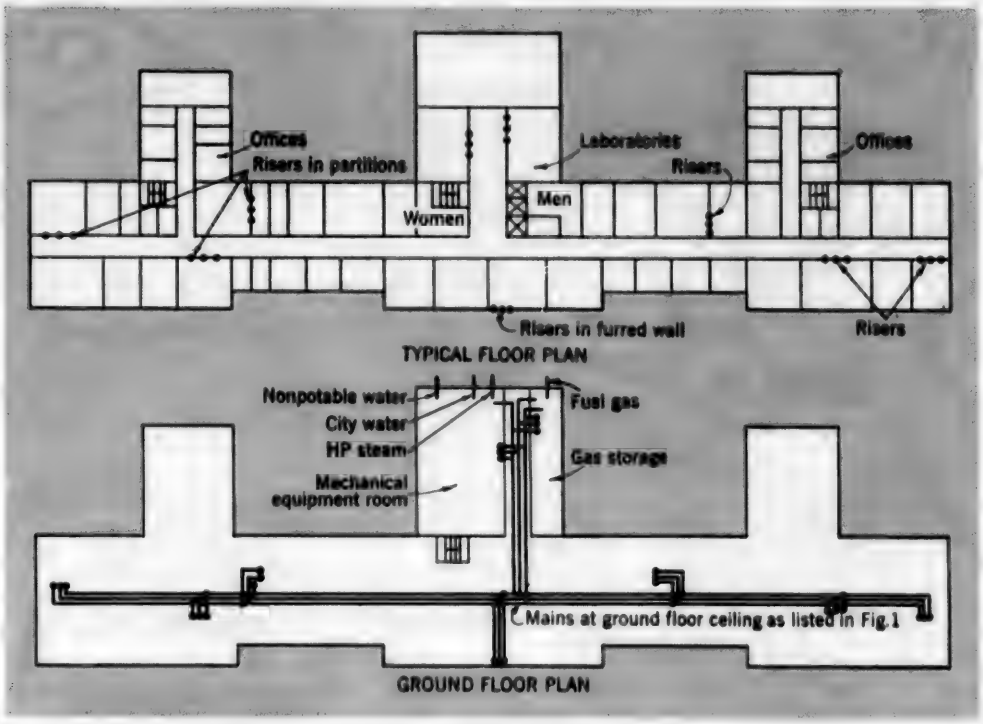


Fig. 2. Vertical distribution system with mains on ground floor ceiling and risers to individual laboratories.

systems of distribution piping may be used. Actually, each is a combination of both.

A horizontal system, Fig. 1, consists of risers in pipe shafts which are connected to equipment or sources of supply on the lowest floor level and in turn connected to mains at the corridor ceiling on each floor. Branch connections from these mains are provided to the equipment in each laboratory.

A vertical system, Fig. 2, provides a complete horizontal distribution system at the lowest floor level to supply individual risers to laboratories at corresponding locations on the floors above.

Horizontal System

The horizontal system of distribution is more flexible and better suited to laboratory buildings with a very dissimilar arrangement of rooms and equipment on various floors.

Risers, corridor mains and branch piping should be arranged in the same order, as this provides a neater appearance and reduces the chance of wrong connections to equipment. See Fig. 3. Valves should be provided at the base of all risers and on take-off connections at each floor. They should be readily accessible and installed in an orderly manner.

Corridor mains, except steam and returns which must be pitched, should be installed at the same elevation and preferably supported on group hangers. Branch connections to laboratories should be taken off the top of the corridor mains, and all shut-off valves should be neatly arranged and located in the corridors where they can be easily reached.

Where several services are required for a laboratory, pipe boxes instead of individual pipe sleeves, may be provided in the corridor partitions. Perforated split steel closure plates should be provided on each side of the boxes.

Branch piping in the laboratories should be spaced a minimum distance apart to allow for proper clearance after covering has been applied, and if any services are to be temporarily omitted, space should be left for their future installation in the proper sequence.

All piping parallel to the corridor walls should be installed at the same level and all piping at right angles to corridor walls at another level in order to ensure proper clearance where pipes must cross.

Exposed piping should not be located over the tops of laboratory tables or other working surfaces because dust might collect on them and later fall off, with adverse effects on laboratory operations.

Drop connections may be provided from branch piping to equipment on the same floor below, or upfeed connections through the ceiling to equipment on the floor above. The latter arrangement provides a neater appearance, but has the disadvantage that work in two rooms is disturbed for servicing or repairs in one room. Floor boxes, of similar construction to the wall boxes in the corridor partitions, may be provided adjacent to equipment for the service piping. Valves on either upfeed or drop connections to equipment should be located to ensure proper spacing between handwheels for operation. See Fig. 3.

Islands with service connections located in the correct order, and at proper height for connection to portable laboratory tables, are sometimes provided in large rooms where the nature of the work requires frequent changes in types of tables. Service connections can be run in covered floor trenches, or supplied from piping on the ceiling below.

If piping is to be concealed, the construction of furred ceilings should be such that sections below the piping may be readily removed and replaced for repairs or changes. Removable panels or doors should be provided for access to valves or other accessories.

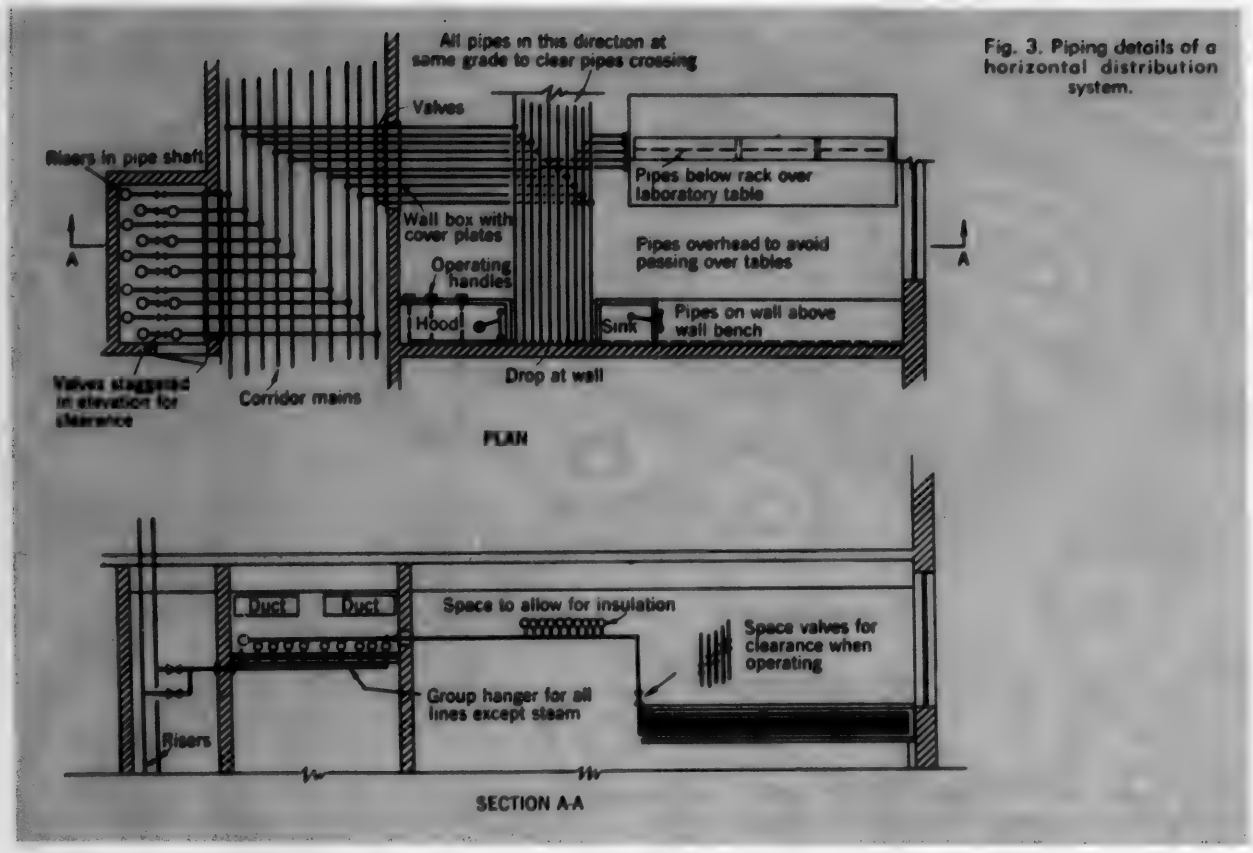


Fig. 3. Piping details of a horizontal distribution system.

Vertical Systems

The module type of laboratory construction is especially adaptable for use with the vertical system of distribution since partitions generally are located at corresponding locations on each floor, and laboratory furniture and equipment are installed adjacent to partitions or walls in which risers may be concealed. However, extensive horizontal distribution is required on the lowest floor to serve the many individual risers necessary with this type of distribution.

Floor beams should be located so that risers may be installed without offsets, and, if the risers are to be concealed in furred spaces along the outside walls, they must be grouped together with heating supply and return risers and roof drains in the limited space between windows. See. Fig. 4.

Horizontal distribution piping from risers in outside walls may be concealed beneath the windows, but must be arranged to allow for the installation of convectors. The services should be protected against objectionable temperature rise due to heat from the convectors.

Center tables should be located with one end close to the outside wall, but if this is not practical, service connections may be installed in shallow covered trenches in the floors. Branch piping for center tables and wall benches may be concealed in the cabinet space below the table tops or racked along the walls below shelves over the wall benches.

Services to be Provided

In addition to electrical services, which are not included in this article, piping systems for the following services are commonly required in a large laboratory:

Steam
Condensate
Cold water
Hot water
Cooling water
Treated water
Compressed air and vacuum
Gas for fuel
Oxygen, hydrogen and other gases
Sanitary and rain water drainage
Chemical wastes
Refrigeration

Steam Service

Steam may be supplied to the laboratory, at pressures up to about 125 psi gage, from a central boiler plant serving other buildings, or at a boiler pressure equal to the maximum pressure required for the laboratory from a separate boiler plant in or near the laboratory building.

If steam at less than boiler pressure is required, it may be supplied through pressure reducing valves in the laboratory building.

Accuracy is of prime importance in laboratory operations and requires the use of expensive and delicate equipment operated by highly trained technicians. Therefore, it is essential to maintain conditions in the laboratory which reduce the liability of errors because of unsatisfactory operation of the equipment and which allow operators to properly concentrate on their work.

Air conditioning may be necessary in certain areas, but may be too expensive for general use throughout a building. A properly zoned and controlled heating system, adequate to meet the demands of the coldest weather of winter, without overheating during the mild days in spring or autumn, can be provided at a reasonable cost and be economical in operation.

Shields should be provided for convectors or radiators to protect those working nearby from discomfort caused by radiant heat.

Steam for heating water and other special laboratory services is required year round and should be supplied from the high pressure main, through pressure reducing equipment independent of the heating system serving the building.

Steam at pressures from 5 to 10 psi gage permits rapid and economical heating of water to 140 deg F, which is adequate for ordinary washing facilities, and up to 180 deg for washing laboratory equipment.

Steam pressures required for stills, sterilizers, hot plates and other equipment depend on the temperatures required at the equipment. The surface temperature of any steam heated equipment cannot exceed the condensing temperature of the steam supplied to it, which is not raised by superheating the steam.

If a limited amount of steam is required at pressures exceeding the boiler pressure available, a motor driven compressor should be provided to boost the pressure of the steam and the corresponding pressure of condensation.

Pressure reducing equipment for all steam services, preferably, should be grouped in the boiler room, if it is in the building, or in a mechanical equipment room on the lowest floor. In this way it can be readily supervised by the building engineer.

For the building heating system and laboratory services requiring varying quantities of steam, but not complete shut off, double seated pressure reducing valves are commonly used. Where the demand for steam to be supplied through a pressure reducing valve is intermittent with positive shutoff, a single seated valve should be used. Where close control of the delivered pressure through a limited pressure range is necessary, a pilot operated valve should be used.

The high pressure steam supply should be dripped before take-off connections to the pressure reducing valves. Shut-off valves should be provided on each side of a pressure reducing valve (plus a bypass with a throttling valve around it). A strainer should be installed ahead of the pressure reducing valve, and a relief valve and a pressure gage should be located on the low pressure side of the valve. The pressure gage provides a means for checking the operation of the pressure reducing valve, and the relief valve protects the system against excessive pressure in case of failure of the pressure reducing valve. The steam piping should pitch in the direction of flow, not less than ¼ in. in 10 ft.

The piping should be supported and anchored to provide for expansion. Where long straight runs are necessary, expansion loops or joints should be provided. Branch connections should be taken off the top of the pipe, valved and arranged with swing joints or with some provision for flexing the branch connections when the mains are hot.

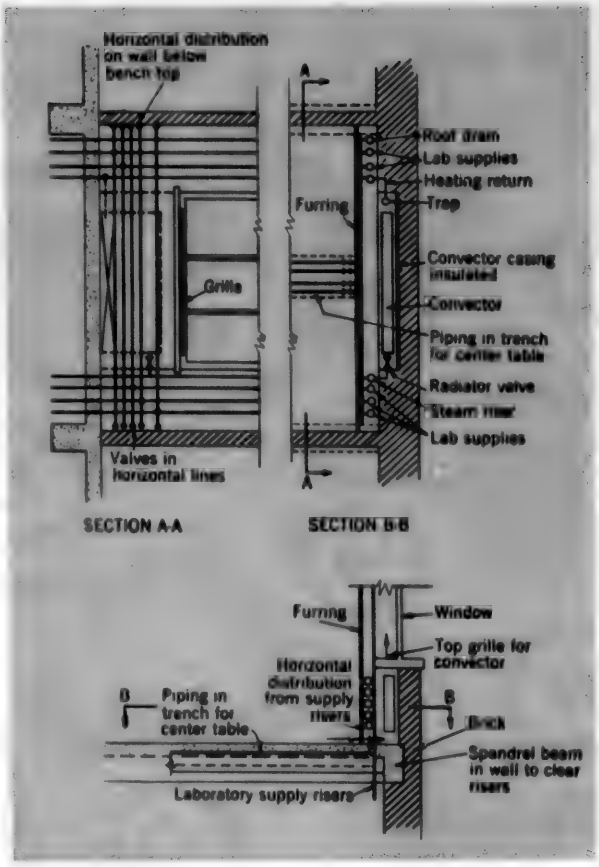


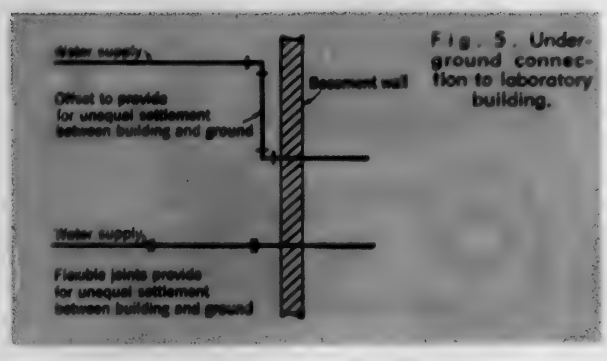
Fig. 4. Detail of vertical distribution with supplies at outside wall.

Condensate

For collection of condensate and its return to the boiler plant, either a vacuum return pump or a vented receiver and condensate pump are required. The former would be necessary if steam at below atmospheric pressure is supplied to the heating surface and might also be necessary with steam above atmospheric pressure, if the return mains to the pump are long and do not have much pitch.

It is essential that all condensate be removed rapidly from coils placed in the ventilating or air conditioning systems and used for heating outside air that may be at freezing temperatures. To facilitate this, the return connections from the heating coils should be the full size of the tappings in the coil casing and should drop 18 to 24 in. before the take-off connection to the trap. Traps should be liberally sized in accordance with instructions from the manufacturer.

Condensate from equipment using steam at higher pressures should be flashed to the year-round system operating at the lowest pressure and drained to the condensate from that system. Provision should be made for operation of the vacuum pump by float control during the nonheating season. The bottoms of downfeed steam risers, ends of all steam mains and long branch connections should be dripped through either bucket or combined float and thermostatic traps. Valves, preferably, should be provided ahead of traps; strainers should be provided ahead of traps on the ends of mains which must be left in continuous service.


Water supply
Offset to provide for unequal settlement between building and ground
Basement wall
Water supply
Flexible joints provide for unequal settlement between building and ground
Fig. 5. Underground connection to laboratory building.

Cold Water

All sanitary fixtures and laboratory equipment from which water is obtained for drinking, washing, or bathing of cuts, abrasions or burns, or preparing foods or medical supplies must be supplied from city water mains or other approved sources of supply. Fire protection systems are also commonly supplied from the city water mains to insure a continuous and adequate supply.

Water for flush valves on plumbing fixtures, or for cooling air compressors, vacuum pumps, refrigeration equipment and similar laboratory uses may be nonpotable water, but it is not permissible to provide any cross connections between the two systems. The piping should be plainly marked if both sources of supply are used, in order to prevent mistakes when making changes or additions to the system.

Water is generally brought to the building through underground mains, and if settlement of the building, or the ground adjacent to it, is probable, provision should be made for sufficient flexibility to prevent breakage of the pipes. This may be accomplished by the use of two sets of flexible couplings located about 10 ft apart, or by a 90 deg offset in the connection to the building, as shown on Fig. 5.

Shut-off valves close to the street main are provided by the city in the branch supply to the building, but an additional shutoff should be installed at the point of entry to the building before the meter. For large systems, a valve also should be provided on the other side of the meter to permit its removal without draining the whole system. The water piping system should be pitched to drain near the point of entrance to the building and a valved drain connection with a hose outlet, or other means for disposal of water, should be provided to drain water from the system.

Hot Water

The problem of supplying hot water to sanitary fixtures and laboratory equipment over large areas on several floors requires careful study, if a system, which is economical in first cost and subsequent operation, is to be provided.

Continuous circulation through all mains and long branch lines is necessary to prevent wasting large quantities of cool water before hot water can be obtained at the fixtures. The piping should be arranged to permit the removal of air which is liberated when the water is heated. This can be done by providing upfeed connections to fixtures on the top floor, especially if a fixture which is frequently used can be located near the main riser from the hot water heater. With a horizontal distribution system, the corridor mains may be connected to form a continuous loop with drops to the main on the floor below at alternate ends of the building. With vertical distribution, pairs of risers may be connected at the top with reversed return at the bottom to prevent short circuiting of any of the risers. See Fig. 6.

A circulating pump should be provided, so sized that the rate of flow offsets radiation losses from the covered piping, with a temperature drop of not more than 5 deg.

Storage type water heaters with internal or external type steam heating elements are most commonly used for supplying hot water to laboratories. Gas water heaters may be used if steam is not available all the year round. Where large quantities of hot water are required over short periods of time, without intermittent requirements for small amounts of hot water, the instantaneous type of heater usually may be installed at a lower first cost, but the instantaneous steam demand will be much greater and the steam piping much larger. Instantaneous heaters may also be used as booster heaters for water to be supplied to laboratory equipment washing rooms.

With widely fluctuating demands, the temperature of the water can be controlled better with the storage type heaters, and the steam demand will be more uniform. Storage type water heaters should be made of copper or other corrosion-resistant material, equipped with a removable heating unit. For best temperature regulation, the unit is supplied with low pressure steam, controlled by a thermostatically operated steam valve with its thermostatic element inserted in the tank about two-thirds from the bottom. Each heater should be equipped with a relief valve to prevent excessive pressure.

Cooling Water

Nonpotable water that is clean and free from scale-forming impurities may be used for cooling services, if it is available at suitable temperature. If large quantities of water are required, the drainage system may be overtaxed and the installation of a cooling tower to permit reuse of this water might be advisable. If the cooling water is to be taken from a stream, then strainers should be provided to prevent leaves, twigs and other material from clogging pumps or condenser tubes. Twin strainers permit the strainers to be cleaned when necessary without shutting down the system.

Treated Water

To permit gravity flow to outlets in laboratories requiring treated water, stills or other purifying equipment should be installed in a penthouse, or other location, which would provide the necessary head for adequate flow at the highest outlets in the system. Many laboratories do not require distilled water and find it satisfactory to pass the water through a two-bed deionizer to remove minerals from the water, or to pass it through ultraviolet irradiators to kill all bacteria, or merely through filters to remove all suspended matter.

Water to be distilled should be preheated and the gases in the water released during the preheating should be vented to the atmosphere. The water should then be boiled gently to prevent carryover of water particles in the

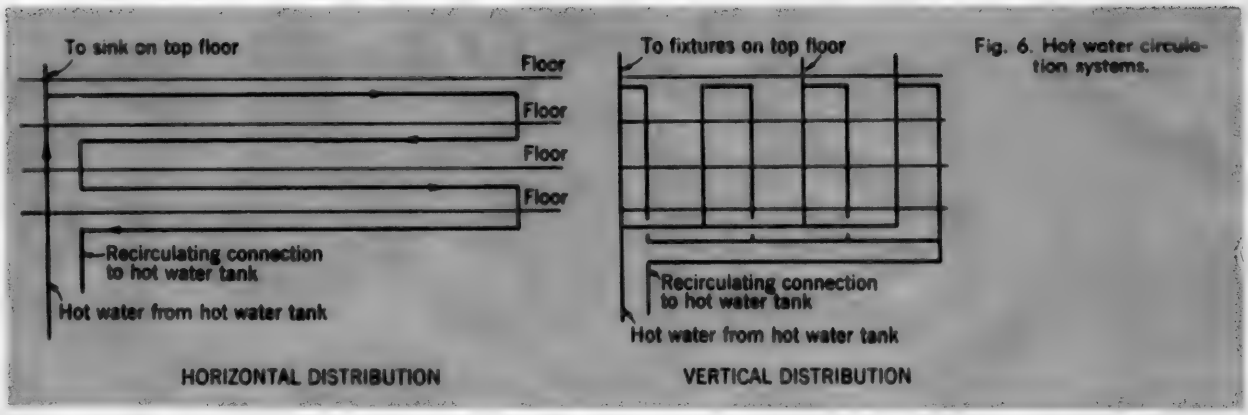


Fig. 6. Hot water circulation systems.

steam, and the steam should be condensed and stored in a glass bottle, aluminum or stainless steel closed tank and piped to the outlets in the laboratories through aluminum or other piping which will not contaminate the water. There should be a limited number of outlets and they should not be located over sinks, in order to discourage unnecessary use of distilled water.

Compressed Air and Vacuum

Compressed air may be required at pressures from 10 to 30 psi at outlets on laboratory tables or at much higher pressures for special services, and the vacuum to be maintained may range from 10 to 29 in. Hg. The compressors and vacuum pumps required for these services should be located in a cool, clean, well ventilated room, preferably on the ground floor where their operation will not affect balances or other critical equipment. They should be mounted on vibration absorbing bases, isolated from the building structure with cork pads.

Compressors for moderate pressures may be single stage. For higher pressures they should be two-stage with an intercooler to reduce the compressor temperature and an aftercooler to eliminate moisture from the air supplied to the laboratory equipment.

The requirements of compressed air and vacuum systems for a laboratory vary considerably, even during a short period, and the determination of the size compressors and vacuum pumps for the laboratory should be based on the experience and judgment of the engineer rather than by computation.

Oversized compressed air equipment requires less frequent, shorter operating periods, but if vacuum pumps are oversized, they tend to cycle, causing excessive wear on the equipment.

Compressors and vacuum pumps should be equipped with receivers to smooth out their operation and should operate under automatic control between fixed pressure ranges in the receivers.

The compressors, intercoolers, aftercoolers and vacuum pumps should preferably be water-cooled, with automatic shutoff on the cooling water supply when the equipment is not operating. When air free from any trace of grease or oil is required, special non-lubricated compressors may be provided.

Gas for Fuel

Gas for use in Bunsen burners, and other heating equipment, in most instances can be piped to the building from the mains of the local gas company. Regulations of the gas company, governing installation of the distribution system and gas burning equipment should be followed, and the calorific value and pressure of the gas should be checked when building requirements are determined.

A minimum pressure of 3.5 in. of water is necessary for proper operation of Bunsen burners, and at this pressure the flow through a standard gas cock is about 8.5 cu ft per hr and at 6 in. about 14.5 cu ft per hr.

If the pressure of the gas supplied to the building is in excess of the requirements for Bunsen burners and other laboratory equipment, regulators for maintaining the required pressure in the system should be provided. If practicable, regulators should be installed out of doors, but if not, they should be installed in a well ventilated room with outside relief connections above the roof of the building.

A pressure booster may be installed to increase the pressure in the mains if it is not sufficient for the proper operation of furnaces or other equipment. Any boosters should be of sparkproof construction with explosion-proof motors and control equipment. A mercury seal should be installed to protect against the collapse of meters in case of excessive suction.

Oxygen, Hydrogen and Other Gases

Oxygen, hydrogen, and other gases for general laboratory operations, may be piped to outlets on tables or in hoods from banks of cylinders manifolded together in cylinder storage rooms on the ground floor, or outdoors, where they can be shielded from sun and rain and protected from physical injury.

Oxygen cylinders should not be located in the same room with cylinders of combustible gases or where grease or oil is stored. Rooms in which oxygen, combustible, toxic or odiferous gases are stored should be properly ventilated to a location outdoors where escaping gases would not be dangerous or objectionable.

Gases supplied in cylinders are bottled at high pressures and should be connected through the cylinder valve and check valve on each cylinder to a high pressure header equipped with a pressure regulating valve. A frangible disc or fusible plug should be placed on each cylinder before the cylinder valve, to protect it in case of excessive room temperature. The check valves prevent loss of gas from all of the cylinders in service, in case of fail-

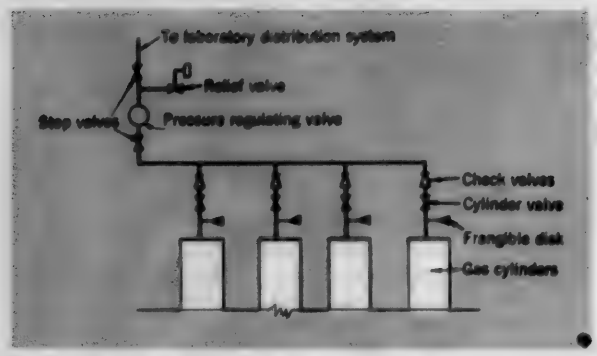


Fig. 7. Manifolds for an oxygen system.

ure of the frangible disc or fusible plug on one cylinder.

A stop valve should be provided on each side of the pressure regulating valve and a pressure relief valve discharging to outdoors should be installed on the low side of the regulating valve.

All low pressure lines should be tested to not less than 150 psi before being put into service.

Sanitary and Rain Water Drainage

The sanitary drain and vent piping should be installed in accordance with local regulations and should be entirely independent of the chemical waste system. Cooling water and other inert wastes, however, may be discharged to the sanitary system.

Chemical Wastes

Laboratory tables frequently have soapstone troughs running their full length, or else lead bowls under each cold water outlet. Hoods often have lead bowls of the same type. Sinks of chemical resistant tile, or soapstone, sometimes are located at intervals on long tables or at the end of free standing tables. All of these troughs, lead bowls and sinks must be connected to the chemical waste system. A single trap for each table is generally adequate.

It is advisable to install traps on the waste from each room in order to prevent possibility of toxic, or obnoxious, fumes being drawn from one laboratory into another due to difference in static pressure in the two rooms.

Refrigeration

Refrigeration may be required for storage of samples at temperatures comparable to those in an ordinary household refrigerator, for lowering temperatures of chemicals below the temperature of cooling water available, or for maintaining rooms at low temperatures.

The modern household type electric refrigerator will usually meet the ordinary storage requirements and small commercial Freon direct expansion or chilled water systems may be used for process cooling. For cooling rooms to subzero temperatures, single or two-stage ammonia refrigerating equipment may be necessary.

The small household refrigerators may generally be installed at any convenient location in the laboratory, but consideration should be given to vibration which would adversely affect the operation of balances or other sensitive equipment.

Ammonia equipment should preferably be installed as closely as possible to the rooms to be cooled and preferably on the ground floor where the vibration will be least noticeable, and in a well ventilated room where it can be properly supervised by the building engineer but is not accessible to unauthorized handling.

Materials

The following materials are suggested for the various piping systems:

Steam. Standard weight black steel pipe, welded where changes in the system are not expected, and with screwed or flanged cast iron fittings where frequent changes are probable. Valves 1 in. and under should be globe valves and 1¼ in. and larger should be gate valves.

Condensate. Standard weight, genuine wrought iron with joints, fittings and valves as specified for steam lines, or type *K* or *L* hard copper tubing with sweated joints.

City Water or Nonpotable Water. Standard weight galvanized steel or wrought iron pipe with cast iron, screwed or flanged fittings, which are galvanized for the smaller sizes, or type *K* or *L* copper pipe with sweated fittings with valves as noted for steam lines.

Hot Water. Type *K* or *L* hard copper with sweated fittings and valves as noted for steam lines.

Distilled or Deionized Water. Aluminum, stainless steel or glass with flanged joints and chemically inert gaskets such as Teflon (polymerized tetrafluorethylene) or other approved material should be used.

Compressed Air and Vacuum. Pipe, joints, fittings and valves as specified for steam lines. Where screwed connections are to be used on vacuum lines, it is important that the threads on the pipe and in the fittings be accurately cut and cleaned.

Gas for Fuel. Standard weight black steel pipe with screwed malleable or steel fittings or welded joints. Joints for piping systems for use with butane or propane should be welded.

Oxygen. Copper tubing, or brass with a copper content of not less than 83 percent. Copper, brass or bronze, brazing type fittings. Piping, valves and fittings should be especially prepared by the manufacturer for oxygen service systems and should be received sealed on the job. If prepared pipe and fittings are not used, they should be thoroughly cleaned of oil and grease and other oxidizable materials before being put into service. Cleaner should be a hot solution of sodium carbonate or trisodium phosphate. Preferably, plug type cocks should be used for stops in gas lines.

Hydrogen and Nitrogen. Standard weight black steel pipe with malleable screwed or welded steel fittings or type *K* or *L* hard copper tubing with brazed fittings. Threads on screwed pipe and fittings should be cut with sharp dies to insure tight joints.

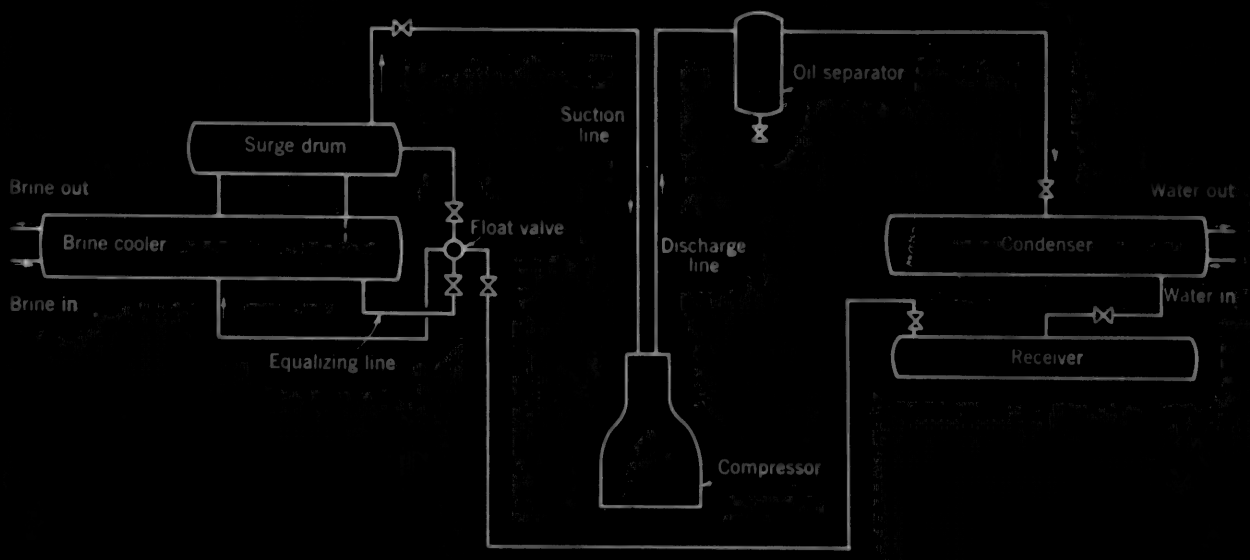
Hydrogen Sulfide. Brass, aluminum or hard rubber pipe fittings and cocks should be used.

Sanitary and Rain Water Drainage. Cast iron soil pipe and fittings for sizes 3 in. and over. Wrought iron pipe galvanized with galvanized cast iron fittings for vents and wastes 2 in. and under.

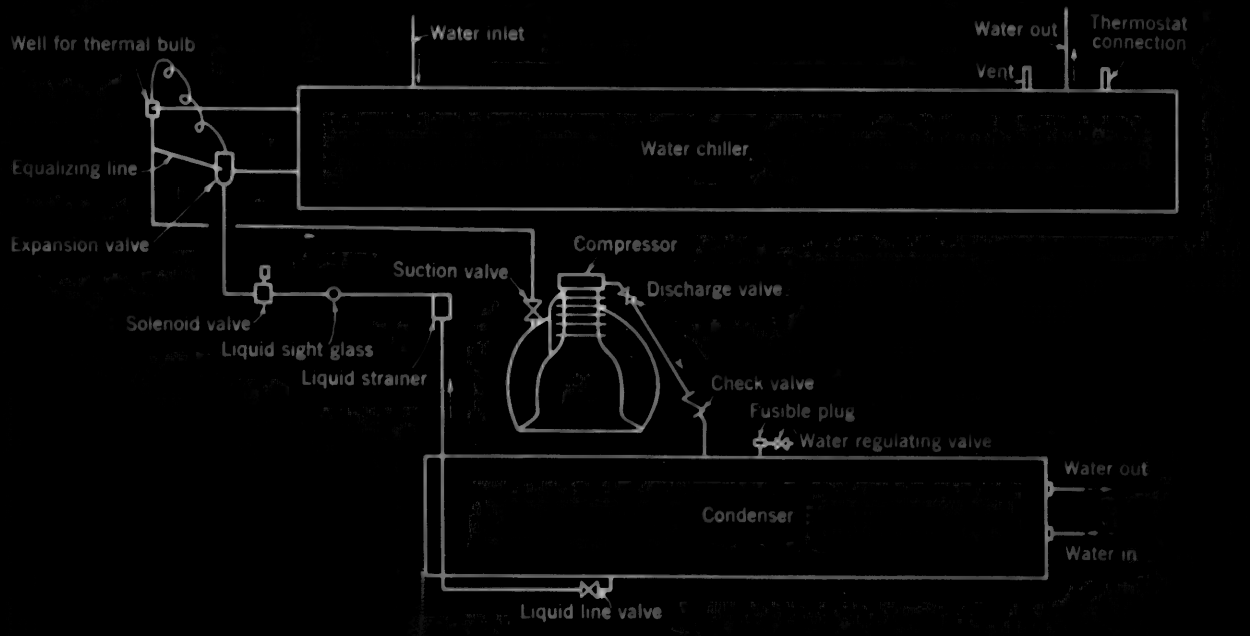
Chemical Wastes. High silicon cast iron, lead, chemical stoneware, synthetic phenolformaldehyde resin or glass.

Refrigeration. FREON—Type *K* or *L* copper tubing with brazed fittings. AMMONIA—Black steel pipe with forged steel fittings and all iron valves.

REFRIGERATION CIRCUITS



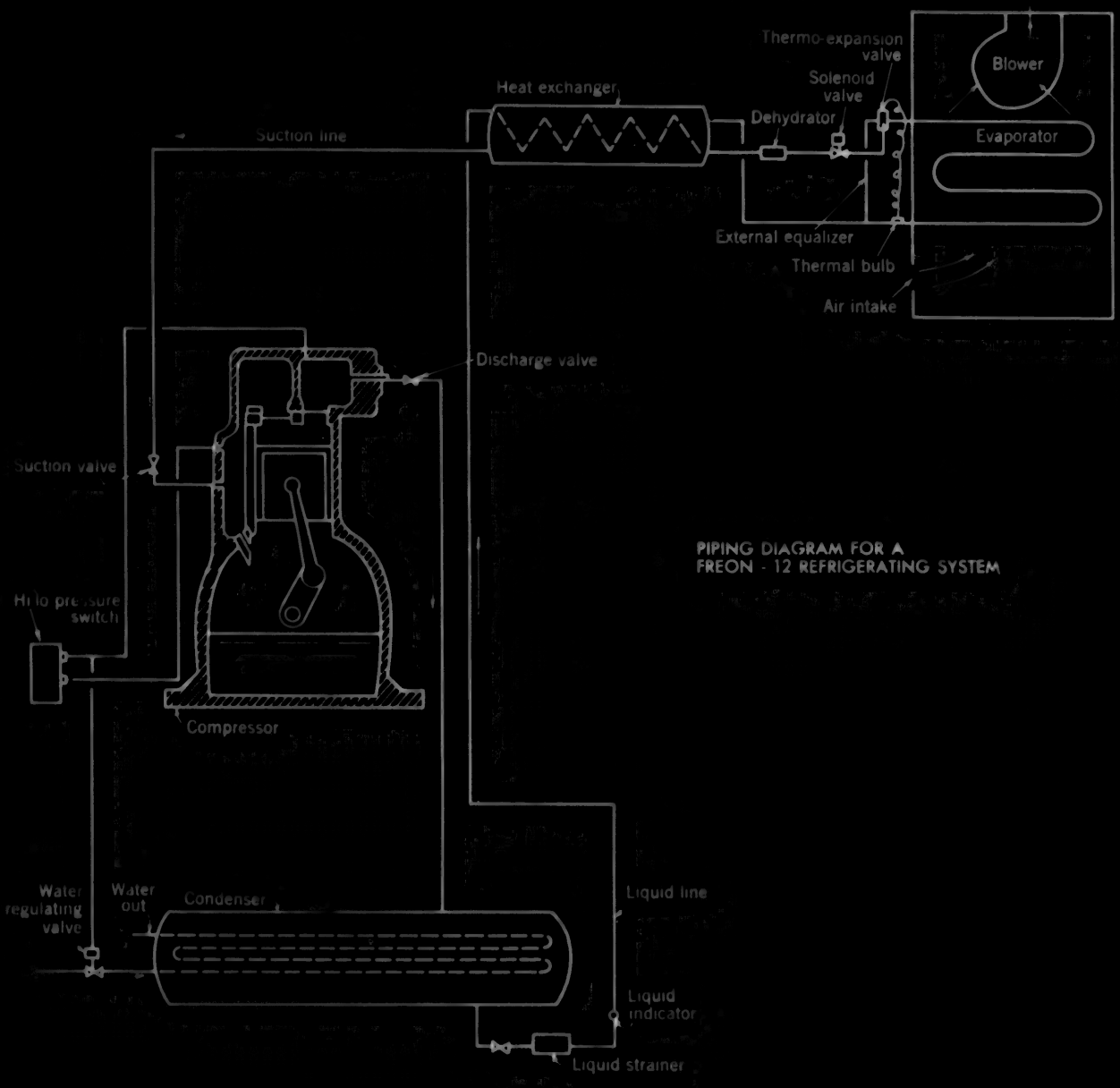
CIRCUIT FOR AMMONIA REFRIGERATION SYSTEM



REFRIGERATION CIRCUIT FOR LIQUID CHILLER

CUT ALONG THIS LINE

REFRIGERATION CIRCUITS



PIPING DIAGRAM FOR A
FREON - 12 REFRIGERATING SYSTEM

DETAILS, COURTESY WORTHINGTON CORP.

Hourly Water and Steam Demand Charts

R. A. ANDEREGG

Consulting Engineer, La Crosse, Wis.

These charts help visualize the fluctuation in demand throughout the working day for the typical laundry, and for a 24-hour period for a medium size hotel.

HOURLY demand charts have been prepared that should be of interest to engineers, architects and contractors who frequently require information regarding hourly demands in steam and water requirements. One chart shows the steam requirements in a typical medium size hotel and the other, the hourly water variation in a typical laundry.

It is interesting to note from the figures that the peak hourly demand for the hotel occurs during 4 to 5 p.m., and for the typical laundry it takes place at 2 p.m.

Hotel

Figure 1 shows the steam required in a typical medium size hotel. The data were collected as the result of tests conducted during a time when the hotel was 85% occupied and with hot water domestic service at 150 deg F. In this hotel, hot water is supplied to the following fixtures.

143 private lavatories
96 showers
22 tubs
8 public lavatories
1 kitchen which serves 200 meals daily

Although Fig. 1 shows the pounds of steam used, on an hourly basis, by multiplying the figures by 1.2, the result is the service hot water load.

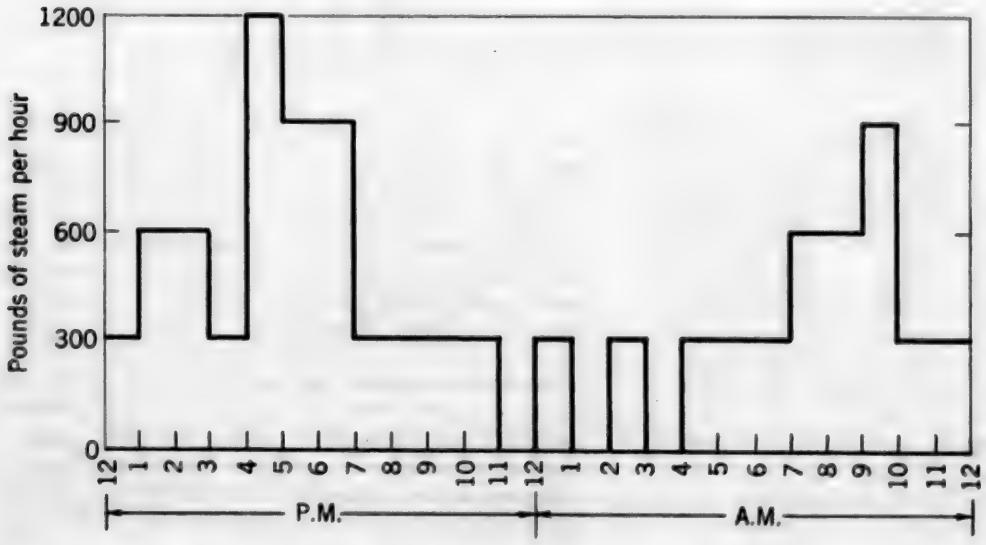


Fig. 1. Steam required for domestic hot water in a medium size hotel.

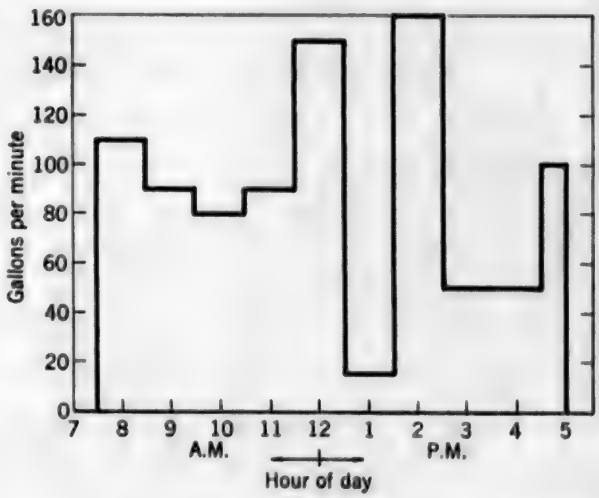


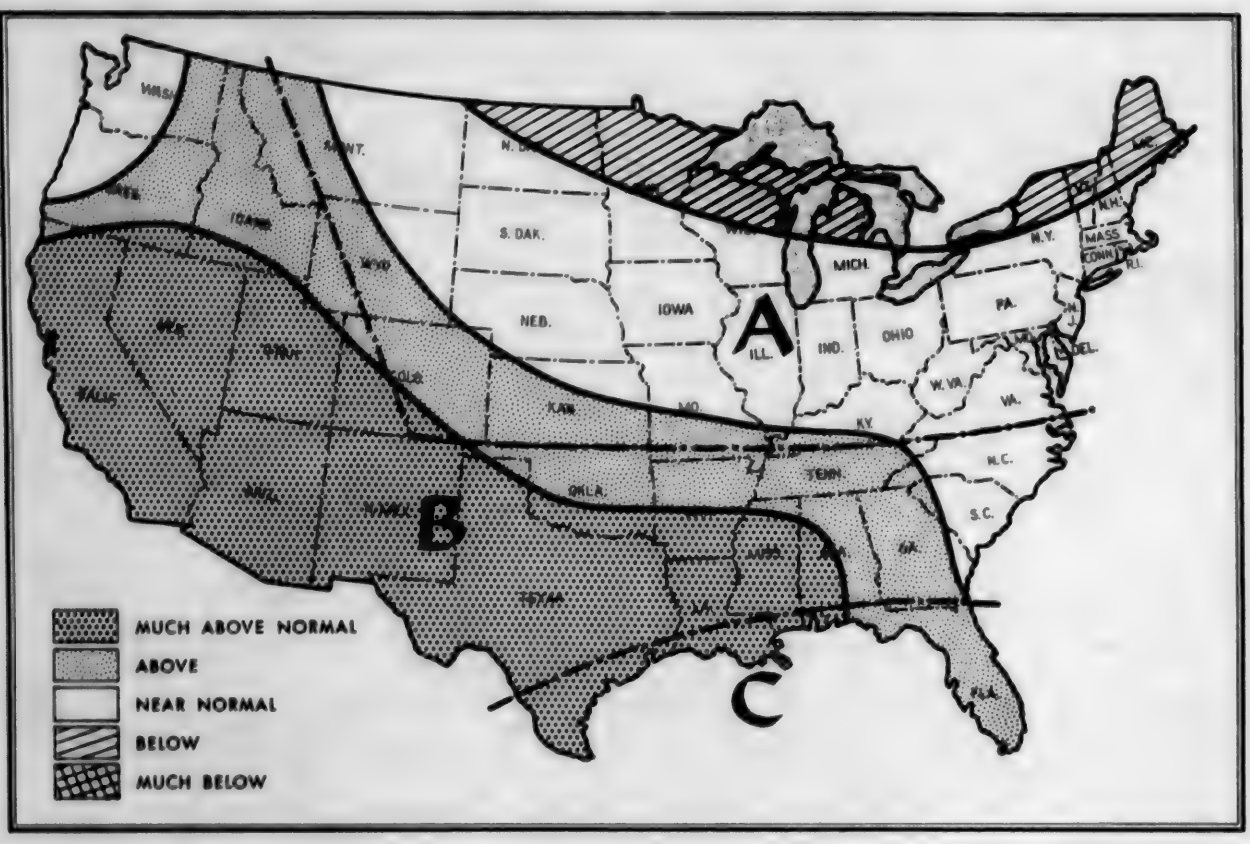
Fig. 2. Water demand for a typical laundry.

Water for Laundry

The total hourly water variation in a typical laundry is charted in Fig. 2. The establishment on which this figure is based washes about 12,000 pounds of material each day. It has been found that the total water demand, expressed in another way, averages 4.5 gallons per pound of laundry handled. For example, the peak water demand comes at 2 p.m. and the low point occurs during the 12:30 to 1:30 period. Figure 2 shows the load for a typical working day while Fig. 1 is charted for a 24-hour period.

Temperature Forecast for May

Prepared for Air Conditioning, Heating and Ventilating by Long Range Weather Consultants.



KEY BY REGIONS

	A	B	C
MUCH ABOVE NORMAL	+4° or more	+3° or more	+2° or more
ABOVE NORMAL	+2° to 3°	+2°	+1°
NEAR NORMAL	+1° to −1°	+1° to −1°	0°
BELOW NORMAL	−2° to −3°	−2°	−1°
MUCH BELOW NORMAL	−4° or more	−3° or more	−2° or more

MAY is expected to be a month in which temperature departures from normal will average rather small over much of the country. Largest departures will occur with much above normal temperatures in southeastern and south central sections, in a broad belt extending from California eastward to the Continental Divide, and east of the Divide in southern sections from New Mexico to Mississippi or Alabama. Temperatures are expected to range as much as 4° or more above normal from Arizona to Texas, with warm conditions prevailing during most of the month.

Over the rest of the country temperature departure for the month will be rather small, but with large variations from day to day and from week to week. Conditions will average moderately warm in the far northwest, and in an extended but narrow zone bordering the east side of the much above normal area and covering much of Oklahoma, Kansas, Tennessee, Georgia, and Florida.

In the northeastern and north central sections of the country temperatures will average rather close to normal, with indications that the averages will be slightly to moderately below normal along the northern border of the country from North Dakota across the upper Great Lakes and northern New York to northern New England. It is in this north central and northeastern part of the country that the temperature regime during May is expected to be particularly variable, with alternating periods of marked warmth and marked coolness. The coolest periods relative to the normal are expected to occur in this area during the early part of the month.

MAY TEMPERATURE FORECAST

The temperature forecast covering the month of May for the United States which appears on the opposite page is a new feature of AIR CONDITIONING, HEATING AND VENTILATING inaugurated last month; a similar forecast will appear each month.

In addition to the monthly forecast, every third month a 90-day forecast will appear, The first of these will be published in the next (June) issue.

This forecast is prepared by Long Range Weather Consultants of Boston. The firm consists of Professor H. C. Willett, Professor of Meteorology, Massachusetts Institute of Technology; I. I. Schell, Research Associate, Tufts College, and William C. Morton III, Department of Meteorology, Massachusetts Institute of Technology.

SCHELL WILLETT MORTON

Both Professor Willett and Mr. Schell have been making long range weather forecasts with measurable success since 1940 and have provided forecasts to the hydroelectric, canning, textile, movies, and other interests. Mr. Morton joined the group in 1952.

The method of forecast developed by the firm is based on weather data from the entire northern hemisphere and a large portion of the southern hemisphere. The organization is prepared to make detailed forecasts on all phases of weather for any portion or all of the U. S. for individual clients.

It is believed that this forecast will prove not only of interest to the readers of AIR CONDITIONING, HEATING AND VENTILATING, but useful as well. The editors will welcome comments from readers.

BOOK REVIEWS

Publications abstracted in this department should be ordered direct from publisher.

MATERIALS OF CONSTRUCTION

New chapters have been added in the sixth edition of Materials of Construction, by the late A. P. Mills, professor at Cornell University; H. W. Hayward, late professor of materials of engineering, Massachusetts Institute of Technology; L. F. Rader, professor of civil engineering, University of Wisconsin. The second, third and fourth editions were edited by the late Prof. Hayward, and the fifth and sixth editions by Dr. Rader.

The first part of the book covers the fundamental properties of materials and methods of testing and requirements of materials in service. Most of the book consists of a detailed treatment of specific materials of construction.

New material added in this edition includes a chapter on service requirements of metals; discussion of the metallography and constitution of metals; a new chapter on mineral aggregates; classification of structural-clay products revised to conform with present practice; refractory and heat-insulating materials; organic protective coatings and organic plastics revised to cover new developments.

The text is divided into 10 sections as follows: Definitions of terms, metals, building stones and mineral aggregates, cementing materials, concrete, brick and clay products, timber, organic plastics, laminates and adhesives, and organic protective coatings.

Materials of Construction, 6th Edition, by A. P. Mills, H. W. Hayward and L. F. Rader. Cloth bound, 5¾ x 9 inches, 650 pages. Published by John Wiley & Sons, Inc., 440 4th Ave., New York 16, N. Y.

STEAM

Advancements in the burning of fuels, the production of steam, and the field of applied thermodynamics have been chronicled through the many editions of Steam which was first published in 1879. All the material in the book is prepared and edited by engineers and specialists in the employ of The Babcock & Wilcox Company. The 37th edition of this book has just been published.

Most mechanical engineers are acquainted with this text and reference book, either because of their use of this book while at college, or through reference to it at their work.

It not only presents the principles of combustion, heat transfer and fluid dynamics, but it has chapters devoted to boilers, steam generation, stokers, pulverized coal, coal storage, fuel ash, utilization of waste heat, care of boilers and related equipment, selection of steam producing equipment, principles and methods of installation, and nuclear power.

It is an all-around book on the subject that is recommended both to the student and to the engineer. The drawings and illustrations have been carefully selected and clearly amplify certain parts of the text. This book may be purchased through book stores.

Steam, its Generation and Use, by engineers of The Babcock & Wilcox Company. Cloth bound, 8½ x 11 inches. Published by The Babcock & Wilcox Company, 161 E. 42nd St., New York 17, N. Y. Price, $10.

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AIR POLLUTION—As part of an over-all Air Pollution Manual under preparation by American Foundrymen's Society, a section has been published on Control of Emissions from Metal-melting Operations. It covers melting equipment types, atmospheric pollution codes and control ordinances, table covering ordinance provisions, metal melting emissions, and information about dust collectors. American Foundrymen's Society, Golf and Wolf Roads, Des Plaines, Ill.

CURRENT CONCEPTIONS ON AIR POLLUTION—W. C. L. Hemeon, engineering director, Industrial Hygiene Foundation of America, Inc., presented a paper before the Philadelphia Regional Technical Meeting of American Iron and Steel Institute in November, 1954, on Current Conceptions on Air Pollution. The paper, complete with graphs and tables, has been reprinted, and a free copy may be obtained by writing to Industrial Hygiene Foundation of America, 4400 Fifth Ave., Pittsburgh 13, Pa.

Bedplates and Supports for Centrifugal Pumps

IGOR J. KARASSIK and ROY CARTER

Centrifugal Pump Division, Worthington Corporation, Harrison, N. J.

Supporting a pump is more than merely bringing it to rest on a firm base. The influences of temperature, hydraulic thrust, orientation, and size itself on the means of support are the subject of this 12th article in a series.

FOR very obvious reasons, it is desirable that pumps and their drivers be removable from the place where they are mounted. For this purpose, they are generally bolted and doweled to machined surfaces which in turn are firmly connected to the foundations. For simplicity of installation of horizontal shaft units, these machined surfaces are generally part of a common bedplate on which the various parts of the equipment have been aligned at the time of manufacture.

The primary function of a pump bedplate is to furnish mounting surfaces for the pump feet which can be rigidly attached to the foundation. Mounting surfaces are also necessary for the feet of the pump driver or drivers or any independently mounted power transmission device used to connect the driver to the pump. While such surfaces could be provided by separate bedplates or by individual planed surfaces under the individual feet, it would be necessary to align these separate bases or surfaces and fasten them to the foundation with the utmost care. Generally this would require mounting them in the field, in place, as well as drilling and tapping for the holding down bolts after all the parts of the unit had been aligned. To minimize this field work, coupled horizontal shaft pumps are generally purchased with a continuous base extending under the pump and its driver (Fig. 1) and usually these are both mounted and aligned at the pump manufacturer's works.

While such bases are designed to be quite rigid, they deflect when improperly supported. It is, therefore, necessary to support the base on its foundations so that the latter supply the required rigidity. Furthermore, since the base can be sprung out of shape by improper handling during transit from the place of manufacture to its point of installation, the alignment must be carefully rechecked during erection and prior to starting the unit.

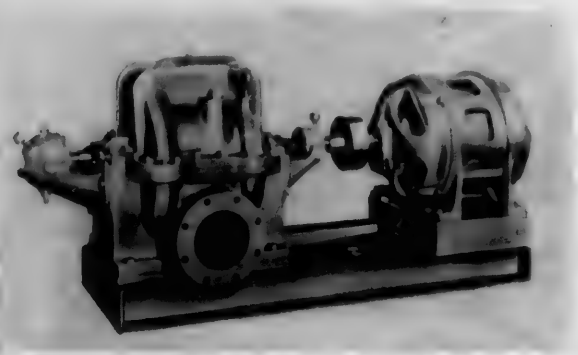


Fig. 1. Horizontal shaft centrifugal pump and driver mounted on a structural steel bedplate.

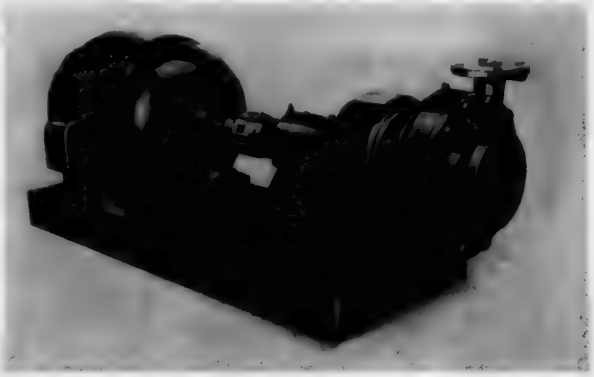


Fig. 2. Small centrifugal pump mounted on structural steel bedplate made of a simple channel.

As the size of the unit is increased, the size and weight of the base required under a pump and its driver increase as does its cost. In most large units the cost of such a base exceeds the cost of the field work necessary to align individual bedplates or soleplates and to mount the component parts of the unit on these supporting surfaces. In such cases, it is cheaper to omit the base and extended bases are used on such units only when appearances or the need for utilizing the base as a drip collector justifies the additional cost.

Even for fairly small units there are cases when there is a considerable difference in the height at which the feet of the pump and of the other elements of the unit are located. In many such cases, a more rigid and pleasing appearing installation can be obtained by using individual bases or soleplates, building up the foundation to various heights under the various separate portions of the equipment in question.

Cast iron baseplates are generally provided with a raised edge or "raised lip" around the base, to prevent dripping or draining onto the floor. The base itself is suitably sloped towards one end so as to collect the drainage for further disposal. A drain pocket is provided near the bottom of the slope and is generally furnished with a mesh screen. A tapped connection in the drain pocket permits piping the drains to a convenient point.

Bedplates fabricated of steel plate and structural steel shapes are now used very extensively. Such a bedplate does not easily permit the incorporation of a raised-lip or drip pocket (Fig. 2). From a utility viewpoint, the usual design of horizontal pumps with bearing brackets forming drip pockets to collect leakage from the stuffing

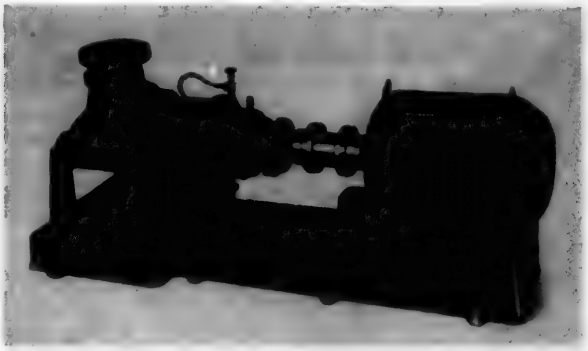


Fig. 3. Single stage hot water circulating pump with centerline support.

boxes now makes the use of a raised lip bedplate unnecessary except for cases where a pump handling a cold liquid, is installed in a moist atmosphere, thus causing considerable condensation on its surface.

Soleplates

Soleplates are cast iron or steel pads located under the feet of the pump and/or of its driver. They are embedded into the foundation and the pump and/or its driver are doweled and bolted to them. Soleplates are generally used for vertical dry pit pumps and also, in order to save the cost of the large bedplates which would be required, for some of the larger horizontal units.

For operation at high temperatures it is necessary that the pump casing be supported as near to its horizontal centerline as possible, in order to prevent excessive strains due to temperature differences which might otherwise seriously disturb the alignment of the unit and cause eventual damage to the pumping equipment. This type of construction (Fig. 3) is generally employed for boiler feed pumps or for hot water circulating pumps operating at temperatures that approach or are in excess of 300 deg F.

Flexible Pipe Connections

The foregoing discussion on bedplates and supports for horizontal shaft units was based on the assumption that the pumps are connected to piping set-ups that do not impose hydraulic thrusts on the pumps themselves. Occasionally it is found desirable to install flexible pipe connections or expansion joints in the suction or discharge piping of a pump, or in both. If such an installation is to be used, the pump manufatcurer should be advised of it for several reasons. First, the pump casing will be required to withstand various stresses due to the resultant hydraulic thrust load and, while rarely could this be a limiting or dangerous factor, it is best that the manufacturer have the opportunity to check the strength of the pump casing. Secondly, the resulting hydraulic thrust has to be transmitted from the pump casing through the casing feet to the bedplate or soleplates and then to the foundation. Usually, horizontal shaft pumps are merely bolted to their bases or soleplates so that any tendency to displacement on these supports is resisted only by the frictional grip of the casing feet on the base and by relatively small dowels. If flexible pipe joints are used, this may not be sufficient as the hydraulic thrust may easily be quite large. For example, consider a pump with 6-inch diameter suction and discharge openings, operating on a system with 250 psi differential pressure. The hydraulic thrust imposed on the pump casing would be $\pi 3^2 \times 250$ or 7070 pounds. When such high hydraulic thrust loads are to be encountered, the pump feet must be keyed to the base or supports. Similarly, the bedplate or supporting soleplates must be of a design that will permit transmitting the load to the foundation.

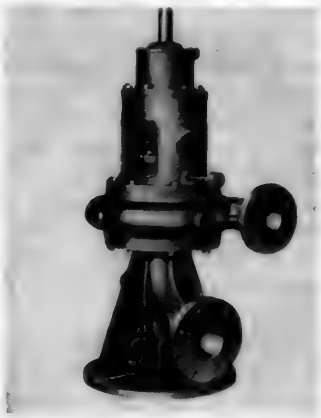


Fig. 4. Vertical single suction sewage type pump with a suction hose elbow for mounting on soleplates or directly on floor.

Supports for Vertical Pumps

Vertical shaft pumps, like horizontal shaft units must be firmly supported. Depending upon the type of installation, the unit may all be supported at one elevation or at several elevations. Usually vertical units are not supported from walls, but even that type of support may sometimes be encountered.

Occasionally, it is desired to use a nominally horizontal shaft pump design arranged with a vertical shaft and it is feasible to use a wall as the supporting foundation. In such a case, a regular horizontal shaft type unit such as shown in Fig. 1 might be used as is, but with the bedplate attached to the wall. When such an installation is made, it is advisable to lock the pump feet to the bedplate by keys, dowels or otherwise, rather than rely strictly on the friction between the pump feet and the

Fig. 5. Large vertical dry pit single suction pump with wing feet on the casing for mounting on soleplates grouted in concrete pads.

Fig. 6. Providing suitable supports for steady bearing of vertical shafting involved considerable trouble when this 500 hp unit was installed in an existing deep pit.

pads of the bedplate to support the pump. Of course, it is assumed that careful attention will have been given to the arrangement of the pump bearings to prevent the escape of the lubricant.

Installations of double suction single stage pumps with the shaft in the vertical position are relatively rare, except for some marine or Navy applications. Manufacturers have a few patterns of such standard pumps so arranged that a portion of the casing itself forms the support, to be mounted on soleplates. Such a pump, in addition, may have a casing extension supporting the driving motor.

Vertical shaft installations of single suction pumps with a suction elbow are quite common in the sewage field. The pump may be furnished with either a pedestal or a base elbow (Fig. 4). This may be either bolted to soleplates or even grouted in. This last arrangement is not very desirable, unless there is full assurance that the pump pedestal or suction elbow will never be disturbed or unless the space grouted in is reasonably regular and the grout would separate from the pump without excessive difficulty.

Vertical single suction pumps with bottom suction are commonly used in the larger sizes of sewage, water supply or condenser circulating applications. Such pumps are provided with wing feet (see Fig. 5) which are bolted to soleplates grouted in on concrete pedestals or piers. In some cases, the wing feet may be grouted right on to the pedestals. These must be suitably arranged to provide proper access to any hand-holes in the pump and to give clearance to elbows at the pump suction if such are used.

Shaft Support

While the driving motors are frequently mounted right on top of the pump casing, one important reason for the use of vertical shaft centrifugal pumps is to locate the motors at an elevation sufficiently above the pump location to prevent any accidental flooding of the drivers. In such cases, the pump and its driver may be separated by an appreciable length of shafting which may require steady bearings between the two units. It is extremely important that these steadying bearings be rigidly supported and maintained in strict alignment. Such support is generally provided by horizontal structural steel beams tied into the wall structure, although occasionally a vertical support tied into the structure is used (Fig. 6). For proper operation of such vertical shafting the deflection of the vertical guide bearings under any operating conditions must be kept within the limits set by the design of the shafting and operating speed. In units of smaller sizes usually a channel between the walls of the station gives adequate support in all directions. Larger units with larger reaction loads on the guide bearings may require two channels or beams with lattice bars. For some installations reinforced concrete beams are incorporated in the structure for support of such guide bearings. Naturally, if the design of the building requires the construction of an intermediate floor, that can be used for support of the guide bearing.

While vertical motors may be mounted directly on soleplates grouted into the floor, it is sometimes necessary to use a separate stand so as to raise the motor and provide access to the coupling. Occasionally, removable beams are mounted directly across a large opening in the floor and the driving motor is mounted on these beams. This allows easy access to the pumps for any servicing, as well as for the initial lowering of the pumps into place during installation.

Fig. 7. Vertical wet pit pump with below ground discharge.

Vertical wet pit pumps are generally hung from a floor and mounted on soleplates. If the discharge is below ground (as in Fig. 7), and a Dresser type coupling is used, it is necessary to watch for the moment which may be imposed on the structure. The pump casing will generally require it be securely attached to some rigid structural members by means of tie rods. If vertical wet pit pumps are of an appreciable length, some steadying device is required regardless of the location of the discharge or of the type of pipe connection. Here again, tie-rods may be used to connect the unit to a wall or a small clearance provided around a flange to prevent excessive displacement of the wet pit pump in the horizontal plane.

Next month—Pump Materials.

NUCLEAR SPACE HEATING

The possibilities of using atomic energy for building heating, desirable temperatures for space heating, and ceiling panel temperatures, are discussed in this month's letter from our London correspondent.

THE biggest news of the month is yet another publication from Elizabeth's Bookshop, entitled "A Programme of Nuclear Power". The declared intention of Her Majesty's Government to go ahead with nuclear energy, even in its present elementary state, for genuine power production, will come as no surprise to readers who now appreciate something of the fuel situation this side of the Atlantic. In essence the proposal is to install by about 1970 enough uranium-fired boiler plant to reduce the annual coal requirements for electricity generation by 45 million tons of coal. All the plants operating before 1965 will be gas-cooled piles; a bit more efficient thermally than the pressure water cooled installation in the submarine Nautilus, but not much.

The paper shows signs of hasty preparation, justifying the whispers that its authors had only a rudimentary knowledge of electric power generation, but it appeared the day before the announcement that Britain is also working on the H-bomb, and its timing was therefore important. Although the main reason for publishing it may have been political, it nevertheless contains some very interesting information. Some of this may have a bearing on space heating, and it is legitimate to indulge in a little speculation.

Nuclear Space Heating

The picture presented is of a plant with a first cost rather more than that of coal-fired steam power plant, but with a fuel cost somewhat less. Probably the capital cost will always be higher than that for coal-fired plant because the difficulty of radiation has to be added to those of handling high-pressure, high-temperature steam; also much of the plant cannot be maintained or serviced once it has started, and a plant which will not break down is necessarily more costly than one carrying no such guarantee. The fuel cost, however, should go down. Although Uranium has 2 to 3 million times the calorific value of coal, natural uranium won't burn for very long. The controlling factor is, of course, the proportion of U235 or of Plutonium present. Below a certain level of enrichment not every U235 atom that explodes succeeds in producing a Pu atom to replace itself, and the stock of fissile material gradually goes down. If one starts with a higher level of enrichment, one can use less moderator, and achieve a net reproduction rate of 1:1, or even higher. This is the fast breeder reactor.

What this means is that it will be possible in time to convert every atom of uranium into plutonium, thus using the whole of it. Per million Btu, therefore, there seems to be a good chance that it will become much cheaper than any other fuel. Now a really cheap fuel, used in one central plant that is mainly or entirely under automatic control, that emits no smoke, has no need of fuel store and no ash disposal problem, seems just the thing for district heating for large towns. There is a waste-disposal problem, of course, but this occurs at the chemical factory where the fuel is processed, not at the boiler plant. The latter is visited every three to five years by a truck which brings some new fuel elements and carries away the exhausted ones.

Even the disposal of waste from the processing factory is now found not to be the headache that was once feared. The waste can be separated chemically into three principal fractions. One consists of material so violently radioactive that it exhausts itself in a few days or weeks; at the other extreme is long-lived and therefore only feebly radiative material; in between is the difficult stuff, but the total bulk of it is quite small.

Desirable Temperatures for Space Heating

If the industrial application of nuclear fission succeeded in bringing down the cost of heating to a price that all Britons could afford, would they agree with Americans as to desirable temperatures? Or would they go on obstinately pretending that they are a hardy stock and don't like being overheated? The Building Research Station has recently carried out a comprehensive survey in two office blocks, and Flora Black has presented the results in a paper entitled "Desirable Temperatures in Offices: A study of occupant reaction to the heating provided" (*I.H.V.E. Journal* **22**, *11*, 319). She finds that there is some evidence to suggest that the temperatures now accepted are rather low. Taken from various authoritative sources these are: an *equivalent* temperature of 65 F is a suitable standard; most people sitting for long periods would feel comfortable in the range 62 to 66 F and variations should not go outside the limits 60 to 68 F; when the outside temperature is 30 to 32 F the design should be based on a 35 deg rise above it; the British Standards Institution's Code of Practice suggests 65 to 70 F.

A comment on the design basis quoting outside temperatures of only 0 to 2 deg below freezing is provided by replies to a questionnaire recently sent out for completion by association members working in laboratories; in half the cases the heating was described as adequate; in ten cases it was described as "adequate except in winter!"

Of the two office blocks investigated by the Building Research Station team, one was heated by radiators beneath the windows (water temperature 140 to 170F), and the other by ceiling panels (90 to 94F). The temperature variation in the rooms was greater in the former case because the boilers were not stoked at night or on Sundays. Fifty-five representative rooms were chosen altogether in the two blocks. They had a population of about 200. Each week about 40 of them were asked to record their feelings about the temperature and ventilation at some time during the morning and afternoon for five days. No one person was asked to complete forms for more than six weeks during the six months period of the

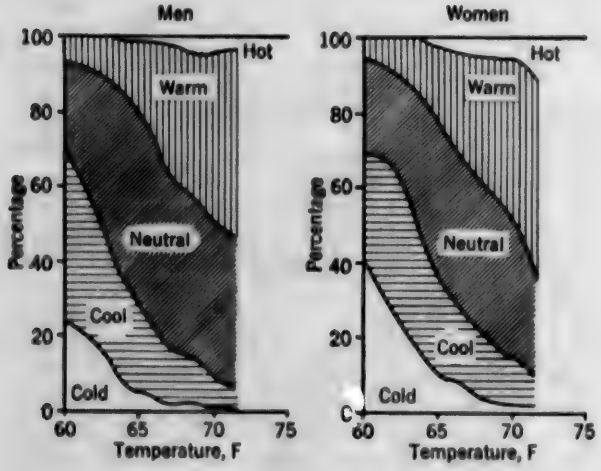
test. The subjects chosen were those who happened to be occupying the rooms at the time, and may be taken therefore to be fairly representative.

A five-point code was used:—Hot; warm; neutral; cool; cold. The subjective indications (over 5000 from each building, with men and women, and mornings and afternoons, all about equally represented) were checked against actual measurements of air temperature at the stated times in each room. A remote-recording resistance thermometer with a chromium plated radiation shield was placed in each room, 5 ft above the floor and about midway between corridor and outside walls. The results are summarised in the figure reproduced on this page. Considering that the subjects did not know what the actual temperatures were, these graphs afford striking proof that a change of a degree or two has a very definite effect on sensations of warmth.

No differences that were in any way consistent were revealed between the two buildings. Since *air* temperature was being measured followers of Dr. Bedford (high MRT, low air temperature) might have expected that in the building with ceiling panels a lower air temperature would have been found comfortable. But this was not so. Of course, this doesn't prove anything. Perhaps there *was* no difference between mean radiation temperature and air temperature in the ceiling panel building. The occupants would then have had no chance of expressing their preference for such a difference. They were asked to report on ventilation also on a five-point scale from "Very stuffy" to "Very fresh." No difference between buildings was observed in this either, and no data are given.

Ceiling Panel Temperatures

A gentlemanly argument on the sizes and temperatures of ceiling panels has recently taken place in French print (*Chaleur et Industrie*, **35**, *347* & *352*, 161 and 333). Floor panels are more popular than ceiling heating in France; so A. Missenard laid the foundation for his own treatise on the subject of ceiling panels by inviting first a paper from F. A. Chrenko of Dr. Bedford's team in the Medical Research Council in Britain. Chrenko describes experiments in which a number of subjects had been placed in a room with a ceiling panel and asked whether they felt comfortable; if not, were their heads too warm? This was done for various panel temperatures with the panel at various heights from the floor, in an experimental test room.



Percentages of men and women reporting temperatures as cold, cool, neutral, warm, and hot, when the air temperatures (unknown to them) were as indicated along bottom line. From *British Journal of the Institute of Heating and Ventilating Engineers.*

The conclusions are presented in the form of a graph showing the maximum desirable size (according to height) of a rectangular ceiling panel at 106F, and also a table showing maximum desirable temperatures for panels of various sizes and heights.

With this paper safely translated into French and published, Missenard proceeds to the attack. His attack is fully justified. But he gets very nearly the same answers by his own methods. Whether this justifies the editorial comment accompanying Chrenko's paper "Wise men content themselves with what exists, fools make inventions" is a point that verges upon the moot. Missenard points out that the fact observed by Chrenko (that about half the subjects who felt uncomfortable said their heads were too warm) means that the other half did not. This other half were probably uncomfortable because conditions were altogether too hot; they would not have been uncomfortable if the air had been a little cooler.

Practically any system which heats by means of warm air, radiators or convectors produces significantly higher temperatures at head level than near the floor. One must conclude either that such systems are very unsatisfactory, or that it is sufficient merely to satisfy most of the people most of the time. It appears from Chrenko's results that only about 10% of the subjects felt warm about the head when sitting down with an MRT at head level 4F degrees above that near the floor. This is considered to be a reasonable proportion of malcontents. Fahrenheit is converted into Celsius and rounded off, and from that point on it is just a matter of mathematics to work out panel sizes. heights and temperatures which should give an MRT difference at head level when standing not exceeding 2 Celsius degrees, or not more than 1 deg when sitting down.

This approach begins to put some theoretical sense into results which have so far only been based on practice and experiment. For the theoretical treatment a man is supposed to be placed immediately beneath the centre of a circular panel. It is obvious that if the panel is very far away. so that the distance from panel to head is not very different from the distance from panel to foot. then the panel can be quite hot without producing much in the way of temperature difference between head and foot. A good example of such a panel is the sun, with a surface temperature of 6000 degrees Celsius. The same kind of reasoning applies to a very small panel. An infinitely large panel would also produce little difference between head and feet. There is therefore an intermediate size of panel which produces a maximum difference between head and foot, and such a panel should not be run above a certain temperature limit in consequence.

Whether the criterion is 1 degree (C) sitting or 2 deg standing, Missenard's calculations give practically the same results, and the differences between his figures and Chrenko's are not serious. There is, however, a trend in the figures. For small panels and low ceilings Chrenko allows a higher temperature than Missenard; for larger panels and high ceilings it is the other way round.

What Would You Do?

Replies to engineering and operating problems of interest to the industrial plant engineer

Conducted by
NATHAN N. WOLPERT
Associate Editor

WHEREVER there is an industrial plant engaged in chemical processing, that plant has need for a large number of pumps to handle various types of liquids and slurries. Plant engineers should find the information presented, in answer to a problem based on pump selection data, of general interest.

Should you have an industrial plant problem that you would like to see treated in this department, or if you have comments that you would like to add to the current discussion, please write to the Editor. Such letters are always welcome.

This Month's Problem

I am planning a survey to see that the many pumps we have (chemical plant) are being properly used. I am interested in selection data which show the proper type pump and impeller for various liquids and also what material is best for pumps in relation to the several kinds of liquids handled.

This Month's Discussion

The type liquid pumped is very important, when the liquid is either corrosive or abrasive or combines these two actions. In the hydrocarbon family, increased volatility becomes extremely important as it concerns the limitations placed on the suction conditions. There are two possible basic treatments of pump applications regarding materials to be used for the various liquids handled:

1. The prospective user has had considerable experience with similar applications and can tell the pump manufacturer how to construct the pump.
2. The user may ask for recommendations based on the manufacturer's experience with applications of similar nature.

Table 1 gives the selection of pump materials to handle specific liquids. Often several materials might be expected to serve under the given conditions.

In pump design, enclosed impellers are most common and the open type or semi-open types are adapted for special purposes. Generally speaking, enclosed impellers are preferred and will give better hydraulic performance than open impellers, unless one or both of the following conditions exist:

1. Liquid handled tends to build up as a scale on moving parts.
2. The liquid contains solids in suspension of comparatively large physical dimensions, but the solids are of such a nature that they will break up when worked upon.

When either or both of these conditions have to be taken into consideration, a pump designed to employ an open impeller should be chosen.

TABLE 1—SELECTION OF PUMP MATERIALS TO HANDLE SPECIFIC LIQUIDS

Liquid Handled	Materials for Pump
Water, gasoline and practically all liquids that are chemically neutral.	Standard cast iron casing with bronze fittings.
Acids:	
Mild	All bronze
Moderate	All stainless steel
Concentrated	Special stainless steels, such as SS type No. 20 and Hastelloy, and in many cases other materials such as monel, all-nickel, rubber and ceramic.
Alkalis:	
Mild	All iron
Moderate	All Ni-Resist or stainless steel
Concentrated	Special stainless steels such as SS type No. 20 or Hastelloy.
Slurries* with neutral chemical strength:	
Low per cent solids	C.I., Ni-Resist and hard irons.
Moderate per cent solids	Hard iron and chrome steels.
Concentrated solids	Chrome steels, Ni-hard, manganese steels.

*If slurries contain all minus ⅛ inch mesh solids, rubber lined pumps are excellent providing temperatures are within range of limitations for rubber.

Problem for the Next Issue

Among the changes being planned for a four-story industrial plant engaged in light manufacturing and assembling, is a central refrigeration system for cooling drinking water. I hear talk about an open type system and a closed type system. What are some outstanding facts about each? What are the advantages and disadvantages of the two designs?

TABLE 2—TYPE SELECTION BASED ON LIQUID HANDLED

Liquid	Basic Pump Type	Type Impellers
Water and other clear non-corrosive liquids at cold or moderate temperatures.	Single or double suction.	Closed except for very small capacities.
Water above 250F	Single or double suction. This is usually boiler feed service at high pressures requiring multi-stage pumps.	Closed except for very small capacities.
Hydrocarbons, hot	Single suction, often of the special type called refinery pumps, designed particularly for high temperature service.	Closed with large inlets.
Corrosives:		
Mildly acid or alkaline	Single or double suction.	Closed except for very small capacities or where liquid tends to form scale on surfaces of moving parts.
Strongly acid or alkaline	Single or double suction with single suction probably less expensive if available for the rating.	
Hot corrosives	Single suction, with many refinery pump types also used here because of high temperatures and corresponding suction pressures.	
Water with solids in suspension: Fine abrasives	Single suction with end clearance wearing fits. If all particles pass through ⅛ inch mesh screen, rubber lined pumps are available which will give many times the life of metal pumps, providing no chemical action or excessive temperatures will deteriorate the rubber. Special rubber compounds can be applied to improve resistance to certain chemicals.	Open, which allows better application of the rubber, except in larger sizes. Also made in closed type.
Coarse abrasives	Single suction. Not available for full range of ratings, that is, small capacities not too easily obtained. Often have very large impellers operated at slow speeds for use when solids larger than 1 inch diameter are the standard diet. This would be of the type called dredge pumps handling sizeable rocks.	Closed.
Pulpy solids such as paper stock	Single suction. Double suction only used on very slight solids concentrations and then with special end clearance wearing fits.	Closed. Open type used to be standard but change to end clearance wearing fits made closed impellers better suited.

One other reason that may rule out enclosed impellers involves the physical proportions of the impeller castings. Therefore, for the convenience of the manufacturers, open impellers are sometimes the only choice somewhat with materials used and with different manufacturers, but roughly, enclosed impellers are usually not made larger than 6 inches in diameter if the opening between sidewalls should be ⅛ inch; or larger than 12 inches in diameter with ¼ inch passage between sidewalls. With wider impellers, open impeller pumps will only show in advantage in possible lower first cost, but the cost of maintenance will definitely be higher and shut downs for maintenance more frequent. Also, overall, operating costs increase more rapidly as clearance between open impeller and side plates are usually not adjustable due to the contoured surface along which the impeller runs in close proximity to the plate.

Table 2 shows the basic pump type and type impellers to use when handling specific liquids.

The information presented was supplied through the cooperation of the Norwood Pump Section, Allis-Chalmers Manufacturing Company.

High Pressure Blending System Placed in Office Building

A system of high pressure blenders for both heating and air conditioning a 12 building, is being installed in the new Seaman's] for Savings headquarters at 30 Wall St., New Yo ity on the site of the former Assay Office. The system was designed by Edward E. Ashley, consulting engineer, and the general building contractor is the William L. Crow Construction Company. Alvord & Smith is the sub-contractor for the blender system.

A blending unit is installed under each of the 300 windows. A thermostat for each group of three or four blenders provides year-round heating and cooling at any temperature desired. Any area of the building may obtain cooling while another area is being heated.

The contractor pointed out that only small ducts are required to handle the 4,000 fpm air delivered to the blenders, and that the need for motors, filters and water connections is eliminated. Outside air may be used for cooling when it is below room temperature.

In this installation, steam is used to operate compressors in the basement, and water for the system comes from a well under the old Assay Office.

PRODUCT APPLICATIONS

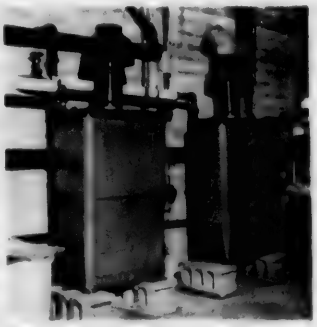
New, Unusual, or Ingenious Uses of Equipment and Materials

Conducted by WM. B. FOXHALL, Associate Editor

Spring Water Heated for Pool

PROBLEM: The management of the lodge in Smuggler's Notch, Stowe, Vt., is faced with the problem of making a large swimming pool comfortable for guests in spite of the fact that it is supplied by 42 degree mountain spring water.

SOLUTION: The resort hotel is now ending its third bathing season with the water heated to a comfortable 66 to 70 degrees by two multi-fin gas heaters made by Ruud Mfg. Co., Pittsburgh, Pa. The heaters are placed in a filter room at the end of the pool. In a wooded area approximately 100 feet from the pool, another building houses twenty-four L.P. gas cylinders which supply the water heaters by underground pipe lines. Water from the bottom of the pool is circulated through the heaters and is returned to the pool about two feet below water level.

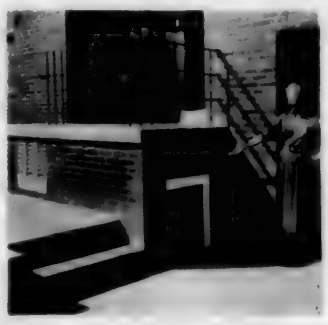


RESULTS: The heaters have been in operation for three seasons heating approximately 2,000 gallons of water per day and maintaining the desired 66 to 70 degree temperature throughout the season. During the 1952 season, the heaters used 93 cylinders of gas at 100 pounds each, and in 1953, 56 cylinders were used. Replacement water is supplied at the rate of 2,000 gallons a day. Management reports that the pool is now usable much earlier in the spring and later in the fall than was possible before heating the water.

Cooling Tower Under Front Porch

PROBLEM: For air conditioning his prize winning house in the parade of homes development outside of Pittsburgh, architect, J. Kenneth Myers required a forced draft cooling tower to be installed without interfering with either the architecture or the landscaping of the house.

SOLUTION: A Halstead & Mitchell forced draft cooling tower was installed under the front porch. Two grilles in the front porch wall serve as intake and outlet. The room under the porch is entered through the basement and provides adequate working space for servicing the tower.



RESULTS: With forced draft, the cooling tower can be placed in any unobstrusive position so long as access is allowed for entering and leaving air and for servicing the unit. The cooling tower cuts air conditioning water bills by more than 95%.

Pipe Corrosion Problem Solved

PROBLEM: When frequent failures occurred in sprinkler lines serving the dye room of Hampden Color & Chemical Co., Springfield, Mass., the plant superintendent was faced with the usual alternatives. He could live with the problem by replacing failed lines with identical piping every two or three years, or he could select a material better adapted to the corrosive atmosphere of the dye room.

SOLUTION: To effect lower maintenance costs and obtain the higher efficiency inherent in continuous plant operation, the superintendent decided to replace the failures with a material that had withstood corrosive conditions similar to those encountered in the sprinkler lines. Failures had been caused primarily by outside corrosion resulting from a combination of condensation and deposits of salt dust on the pipes. Corroded pipe was replaced with wrought iron pipe, product of A. M. Byers Co., of Pittsburgh, on the basis of past performance in the presence of salt water.

RESULTS: The wrought iron pipe, although installed more than ten years ago, is still in service. The slightly higher first cost of wrought iron has been more than offset by extended service life and lower maintenance. Wrought iron is now used by Hampden for corrosion protection in other applications including domestic water lines, boiling tanks and other services.

Boilers Hit Peak Load in Summer

PROBLEM: The new 40-story, $25 million Republic National Bank Building in Dallas, Texas, has exterior curtain walls weighing only 4.5 lb per sq ft, believed the lightest construction for a major building to date. Air conditioning for the building consists of a central system using two 936-ton centrifugal compressors located in a fifth basement level. Each of the compressors is driven by a steam turbine. Steam demand for the turbines is such that rated boiler capacity must be 50,000 lb of steam per hour. Steam is supplied by two Babcock & Wilcox 2-drum, bent-tube, natural gas-fired steam generators located on the

(*Continued on page* 116)

(*Continued from page* 115)

fourth basement level. Winter heat requirements are only a fraction of the rated boiler capacity, with the result that boilers operate at peak load in hot weather. Since steam is delivered to the turbines at 398 F and 225 psi, the problem of maintaining tolerable temperatures in the fourth and fifth basement was serious.

SOLUTION: Each steam turbine is factory-insulated with 2-in. of 85% magnesia blocks. A sheet metal casing is fitted over the insulation on each turbine. Condensers, feedwater heaters, boiler feed pumps, and flash tanks are insulated in place with 2-inch magnesia blocks, laced with galvanized wire and finished with a ½-inch layer of asbestos cement troweled to a smooth finish. All piping operating from 75 psi up, has nominal 2-inch thick sectional 85% magnesia insulation finished with pasted canvas. All other steam piping and condensate lines, have nominal 1-inch thick magnesia insulation.

RESULTS: Insulation not only helps maintain comfortable work room temperatures but also serves to conserve heat and assist in efficient steam distribution.

Oil Tank Overcoats Cut Steam Costs

PROBLEM: The Fuel Oil Corporation of River Rouge, Mich., had been using waste steam from a nearby steel plant to heat heavy fuel oil in storage tanks. When waste steam supply was to be curtailed, the company faced a serious problem in cost of maintaining 120F temperature in four tanks, the largest of which measures 117 in diameter by 41 ft high.

SOLUTION: Officials decided to insulate the tanks so that temperatures could be maintained without excessive steam costs. Foamglas, product of Pittsburgh Corning Corporation of Pittsburgh, was applied to over 50,000 sq ft of tank surface. Blocks of Foamglas 2 inches thick were banded to the tanks and then sprayed with a coat of asphalt. Asphalt-impregnated glass fabric was imbedded in this coat and another layer of asphalt sprayed on as the final coat.

RESULTS: Insulation cuts steam consumption by over 50%. Cellular glass retains its insulating properties in all kinds of weather because it is impervious to moisture. It is also resistant to acids and fumes and will not rot or deteriorate even though tanks are located in a heavily built-up industrial area.

Plastic Pipe Guards Drug Purity

PROBLEM: In one of the plants of Eli Lilly and Company, Indianapolis manufacturers of pharmaceuticals, several piping situations called for materials able to withstand corrosive conditions. In one case, ¾-inch vacuum lines were installed to serve vessels used in precipitating ether. In this application, carbon steel piping had been subject to the corrosive action of entrained moisture and sweating. Another application involved a 1¼-inch drainage line for handling spent hydrochloric, sulfuric and other acids at room temperature. A third application was used to carry dilute sulfuric acid to the cooling tower.

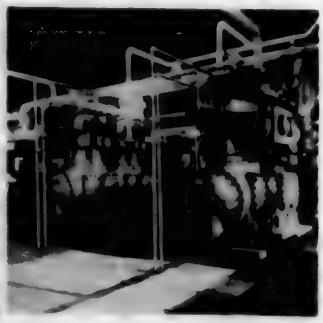
SOLUTION: Unplasticized polyvinyl chloride piping was installed in all three applications. Piping systems were fabricated with molded screwed fittings produced by Tube Turns Plastics, Inc., Louisville, Ky. The fittings are made by an injection molding process and are said to be stronger than fittings made by conventional compression molding processes.

RESULTS: Piping is inert and non-toxic, and thus contributes to high quality of the company's products. Its corrosion resistance has cut piping costs in the services for which it is used.

Fertilizer Plant Uses Refrigeration

PROBLEM: The largest fertilizer plant in Latin America produces 200 metric tons of ammonium sulphate daily and 200 metric tons of superphosphate. Location of the plant at an altitude of 7,300 ft above sea level was an important consideration when temperature and pressure calculations were made for the refrigeration machinery required in the production processes.

SOLUTION: Two Frick 4-cylinder ammonia compressors supply refrigeration for two purposes. A portion of the load consists of cooling circulating solutions which absorb unwanted components of synthesis gas; the balance of the load is taken up in cooling high pressure synthesis gas to condensing temperatures. A 16-ft ammonia receiver and two 14-ft vertical ammonia condensers with capacities of 157 tons each comprise the liquefaction stage.



RESULTS: The chemical processes involved in making fertilizer are maintained by refrigeration, and produce a portion of the liquid ammonia output of the plant by condensing synthesis gas.

NEWS OF EQUIPMENT AND MATERIALS

Use the convenient prepaid postcard on page 138 for securing additional information on items described in this department.

Air Conditioned Test Cabinet

An air conditioned test cabinet to provide control of relative humidity and temperature for testing materials, products, or specimens is being made by Niagara Blower Co., New York, N. Y. The method used is that of saturating air at the required dew-point temperature and reheating to the desired dry-bulb temperature.

The control of relative humidity to close tolerances is given in the range of 5% to 95%. The dry-bulb temperature at which this control is provided will depend on the collateral services afforded. With simply water and electric power, the top of the range is approximately 150 deg F, and the low limit depends on available water temperature. When refrigeration is provided, the company's No Frost liquid can be used in the spray water, and the dew point temperature can be taken as low as minus 30 deg, with a corresponding lowering of the dry-bulb temperature at which low humidities can be produced. No moisture-sensitive instruments are required to achieve and hold the control, and recording instruments can be used.

The test cabinet dimensions are 30 by 28 by 24 in. with a clear opening for access of 26 by 22 in. The air conditioning unit is accessible, and is located in an insulated cabinet. There is also a window for viewing the test material adjoining the test cabinet. Both cabinets are insulated.

More information? Circle Item 1 on postcard, page 138.

Integral Horsepower Motor

An integral horsepower motor that can be mounted either in overhead, side wall, or standard floor positions is available from Marathon Electric Mfg. Corp., Wausau, Wis.

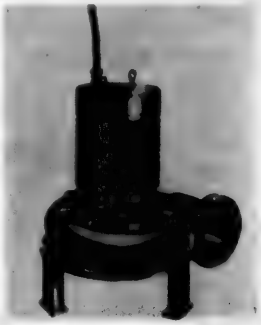
The motor has cast iron brackets, screened openings, and an enclosed cast iron frame with reinforced, milled feet. Its stator is internally ground to provide a uniform air gap. Vinyl acetal resin is used on the conductors, and the winding is impregnated with silicone-treated varnish.

The motor is available in single or three phase ratings and also in a totally enclosed, fan-cooled model.

More information? Circle Item 2 on postcard, page 138.

Two Additional Pump Sizes

Heavy-duty submersible sewage and drainage pumps are being manufactured by Weil Pump Co., Chicago, Ill., with discharges of 5 and 6 in. and capacities to 2000 gpm. The pumps are heavy-duty screenless types equipped with a non-clog impeller. Their motors are mounted directly on top of the pump casings.



The impeller is made of manganese bronze and the pump shaft of stainless steel. The bearings are sealed ball bearings; the pump casing is a volute type made of nickel iron. The motor housing is made of ribbed metal, and is sealed to exclude dirt and water.

Motor, housing, drive shaft, and impeller constitute an integral and interchangeable unit which can be removed without disturbing the discharge pipe.

The pumps are available in a 4-in discharge with capacities to 400 gpm; in the 5-in. discharge with capacities to 1250 gpm; and the 6-in. discharge with capacities to 2000 gpm.

More information? Circle Item 3 on postcard, page 138.

Heating and Cooling System

The Percoflash recessed unit air conditioning system is a central system with forced water for balanced heating and cooling developed by Westcott-Alexander, Inc., Madison, N. J.

The system can be specified for structures such as homes, offices, motels, stores, clinics, hotels, factories, or commercial buildings, either single or multi-floor. Because of the variation in output for both heating or cooling, depending on the dial-speed selected, its capacities can be increased on commercial and industrial applications over the recommended maximum for domestic applications.

The independent operation of the system's units permit a temperature balance between rooms when heating or cooling. The units have a manual speed control for individual room temperatures; are 17-¾ x 14 x 4-¾ in.; install vertically flush to the wall between studs; occupy no floor space; and have concealed piping. They filter the air in each room, using individual room air filters.

The system can be installed on 2-pipe balanced reverse systems, single or multi-loop Monoflo systems, and single or multi-manifold parallel systems.

More information? Circle Item 4 on postcard, page 138.

Multiple Branch Tee

A multiple branch tee with integral extruded outlets is introduced by Tube Turns, Div. of National Cylinder Gas Co., Louisville, Ky. It makes possible a solution to many header problems in the petroleum, chemical, and power fields, and can also be used advantageously in the fabrication of piping for air conditioning and radiant heating systems.

A recent change in the Code for Pressure Piping, Section 8, suggested the need for the tee. The Code change recognizes the weaknesses of pad and saddle type reinforcement and requires the use of welding tees, or full encirclement reinforcement, for large diameter openings and working pressures that develop hoop stresses exceeding 50% of the yield strength of the run pipe.

The multiple branch tee conforms to the Code's area replacement formula. It is especially useful where branch outlets are appreciably smaller than the run pipe.

Its size, wall thickness, and the number and size of the outlets are determined by individual service conditions. It is available in all commercial metals and alloys.

More information? Circle Item 5 on postcard, page 138.

Line of Water Coolers

In introducing its line of electric water coolers, Cordley & Hayes, New York, N. Y., announced that most of them are being made with triple-effect cooling systems. As a result of this improvement, the capacities of individual models have been increased up to 30%.

In the triple-effect cooling system, water is pre-cooled, flashed-cooled, and then chilled in storage. In the pre-cooling phase, incoming water or tap water is chilled by the cold water that spills down the cooler's drain. Previous models had pre-cooling and storage cooling systems; however, the flash cooling phase is new.

The company also announced other major improvements. They are dual hand and foot controls, thermostatic protection for the storage system, and thermostatic control of the drinking water temperature.

Seven new models will be put out this year. Five are air-cooled and two are water-cooled; their capacities range from 5 to 27 gph.

An adjustable thermostat controls the temperature of the drinking water. It has a 7-point dial that is used to regulate temperatures over a 10-degree range. An extra pre-set and non-adjustable thermostat protects against mechanical failure that might cause freeze-up in the storage tank.

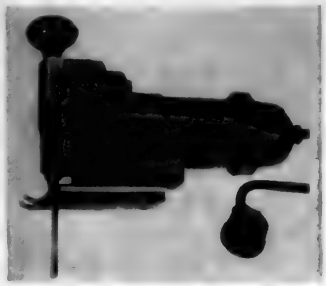
The foot and hand controls for operating the water valve work independently. Both are mechanically operated, and are not affected by power failures. The foot pedal is made of tubular stainless steel; the pushbutton hand control is made of chrome-plated brass.

The general features of the units include: 19-gage electro-galvanized steel, phosphorized after forming; an infrared baked Hammerloid neutral gray finish; a recessed rust-inhibited black base; a removable front panel for access to the interior; a sealed water cooling unit; a sealed refrigeration unit; a sealed fan motor, on all air-cooled models; Freon-12 refrigerant; and an 18-8 stainless steel top.

More information? Circle Item 6 on postcard, page 138.

Duct Cutter

A 2-in. capacity power saw, called the Whiz-Saw Model No. 2, for use in plumbing, building, and duct work is made by The Forsberg Mfg. Co., Bridgeport, Conn.



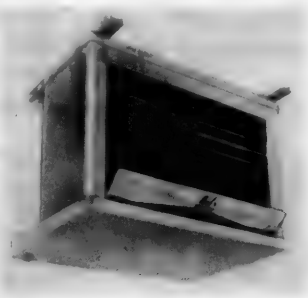
Made for a-c or d-c current, the saw operates on 115v and 60 cycles. It is furnished with three blades and can deliver 2200 blade strokes per minute, cutting most materials up to 2-in. thick and thin non-ferrous metals.

Weighing 6-3/5 lb, it can be guided with one hand while making curved, irregular, or straight cuts.

More information? Circle Item 7 on postcard, page 138.

Inside Fins Defrost Coils

Inner-fin, a patented development in finned coil design, is the key to the construction of two unit coolers introduced by Bush Mfg. Co., West Hartford, Conn. They are the HG hot gas defrost unit (illustrated) and the ED electric defrost unit. The company is making both units available with kits consisting of a timer and the necessary controls to form complete systems for low temperature refrigeration applications.



Both units defrost from the inside. Company officials point out that the coil construction provides more rapid distribution of heat, holding room temperature rise to a minimum.

The hot gas unit is actually two units in one: an evaporator and re-evaporator combined. The inner tube of the coil is the re-evaporator circuit, and the heat of compression provides the source for heating the gas during the defrost cycle. Re-evaporation of the liquid refrigerant occurs within the inner-tube, eliminating dependence on a suction line for this function.

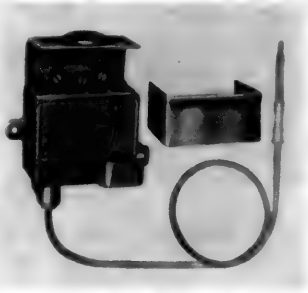
In the electric unit, the heat source for defrosting is a specially designed heater cable contained within the inner tube.

More information? Circle Item 8 on postcard, page 138.

Automatic Gas Shut-off

A rotary reset thermopilot relay, the A-100 series, for automatic safety shut-off of gas-fired appliances is being produced by General Controls Co., Glendale, Calif.

When used with an electric valve in the main line, the relay with a pilot valve provides 100% shut-off without reducing the manifold capacity, by the addition of a pilot safety valve. The less expensive relay without a pilot gas valve can be used when 100% shut-off is not required.



The design of the rotary reset thermopilot relay assures safe lighting conditions and gives visual indication of the valve's position.

When the knob is turned to the *off* position, the gas flow to both the main burner and the pilot light stops immediately. There is no delay while the thermocouple cools down.

There are 3 models in the series, one with a bushing-type connection for the thermocouple, another utilizing the company's G-250 pilot generator, and a third, a double bushing type, for use with a limit control in the generator circuit.

The rotary reset relays carry AGA and UL approval and are furnished with either SPST or SPDT wiring, or with special ignition contacts.

More information? Circle Item 9 on postcard, page 138.

Plastic Pipe Price Is Cut

A 17% price reduction on plastic pipe is announced by Carlon Products Corp., Cleveland, Ohio, manufacturers of extruded plastics. The company credits the price reduction to a drop in material costs and savings in manufacturing, which are being passed on to users.

The company believes that the plastic pipe industry has reached a point wherein the standardization of manufacturing quality and distribution policies can bring plastic pipe to the consumer at lower prices.

More information? Circle Item 10 on postcard, page 138.

Trailer Carries Pipe

A trailer unit for transporting pipe and other material around yards and industrial plants is being marketed by Hawkeye Industries, Longmont, Colo.

Known as Wheel-it, the 2-wheeled equipment is capable of supporting 6000 lb because of its welded steel construction. (See photo showing cross-bracing.)

The trailer weighs 600 lb, and is built of channel steel frame and rolls on Timken tapered bearings. There are no bolts in its construction and the frame is drilled for a floor. The standard telescoping tongue accommodates loads up to 24 ft in length. It will fit a standard trailer hitch.

The unit is 12 ft long, 49 in. wide between the stakes, 57 in. wide overall, and 3 ft high. Four 30-in. stakes adjust sideways against the load, and lock or turn down into the frame to make a flat top. The four extension legs are adjustable for stability when loading or unloading.

The Model 700 is the latest of five models, and has improvements based on the past seven years of experience.

More information? Circle Item 11 on postcard, page 138.

Rubber-Base Coating

A synthetic rubber coating material, which it calls Nerva-Kote TNE, is being produced by Rubber & Plastics Compound Co., Inc., New York, N. Y., manufacturers of heavy-duty corrosion protective and waterproofing materials.

When applied to metal or concrete, the coating forms a rubber film to prevent the attack by corrosive fumes, salt spray, alkalies, oils, and aliphatic solvents. It is waterproof and resists abrasion and weathering. It is intended for the protection of structural steel, ducts, tanks, gutters, railings, and pipes.

The company feels that the coating is relatively inexpensive to apply because it requires two, or at the most three, coats without priming or preparation.

More information? Circle Item 12 on postcard, page 138.

Cold Water Pipe Covering

A plastic cork pipe covering, commercially known as NoDrip tape, is a product of J. W. Mortell Co., Kankakee, Ill., that stops cold water pipe drip without the aid of extra vapor seal tapes or overwraps.

The tape is a protective covering in itself, and, as such, offers a moisture barrier which will resist water absorption under variations of temperature and humidity. It is self-adhering and can be applied snugly and evenly without seams or ends coming loose to allow the entry of moisture-filled air. It needs no metal bands, brads, or clips to fasten, and covers joints and valves as easily as straight pipes.

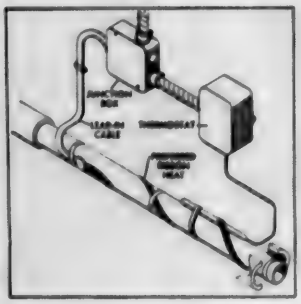
Of equal importance to the user of the tape is the effect it will have in commercial establishments where certain storage and production areas are blocked off as unusable because of condensation pipe drip. At small cost, these areas can be converted to work spaces where machines, equipment, and products will be protected from damaging moisture and water.

The tape is installed by hand-wrapping it spirally around pipe or tubing. Once on, it stays on, and is effective as soon as applied. Although it is brown in color, the covering can be painted any color with ordinary water emulsion paints.

More information? Circle Item 13 on postcard, page 138.

Tape Pre-Heats Fuel Oil

A convenient and inexpensive means has been developed by Preferred Utilities Mfg. Corp., New York, N. Y., for electrically heating suction lines carrying residual No. 6 oil from the fuel tank to the pump and heater. Its purpose is to keep the oil in the lines at a pumpable temperature, especially during burner shutdowns or out-of-service periods, by making up the radiation, convection, or conduction losses from the piping.



The new product, known as Preferred Ribbon Heat, is a low temperature lineal heater in the form of flexible tape, ½ in. wide and 1/10 in. thick, of fusible alloy resistance wires, suitably braided, insulated, and protected for continuous use under service conditions.

The tape is spiralled in any required length directly around the suction piping. It can be applied at any time during a new installation or added to an existing oil piping system. The end of the heating tape is attached by a waterproof connection to a 3-ft non-metallic sheathed cable, thence to the electric supply. A thermostatic sensitive bulb, strapped against the pipe, leads to a thermostatic control. The cable is directly connected into any standard electric outlet box.

The use of the tape is based on maintaining a pipe line temperature at either 100 or 120 deg F. The selection of the required unit length depends upon the voltage and the heat loss from the pipe surface and through the pipe line insulation, with the electric current input to the tape always thermostatically controlled.

More information? Circle Item 14 on postcard, page 138.

Pilot Is Mounted on Valve

A valve and pilot control package which increases the flexibility of control systems available to manufacturers and dealers of gas room and wall heaters is announced by Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

The control is known as V5153 Adatrol, and includes a basic valve section on which the company's gas cock pilotstat is factory-mounted. Models may be purchased with thermostats also factory-installed or the unit can be supplied with a thermostat kit.

To add the thermostat the manufacturer, dealer, or serviceman has to remove a blank plate from the basic valve and mount the thermostat with six screws. No other piping or special fittings are needed.

The package control is also available with two other add-on features: a minimum rate high-low by-pass assembly and a spring-loaded pilot filter. Both can be mounted by the equipment manufacturer or by the dealer in the field.

The package system enables equipment manufacturers to supply basic valves and pilot controls in a single installed unit for each appliance manufactured. Thermostat sections, by-pass assemblies, and filters can be provided, either installed or in add-on kits, according to customer orders, thereby reducing both the manufacturers' and dealers' inventories of accessory equipment.

The range of the thermostat is 55 to 95 deg F. The by-pass mounts below the Pilotstat valve. Safety shutoff or safelighting are not affected by the use of the by-pass.

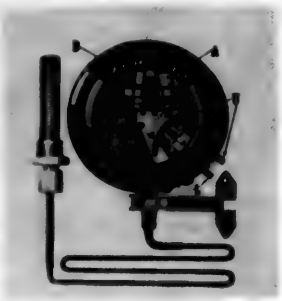
The control is available in ½ and ⅜-inch sizes, and the pilot flow adjustment screw is standard equipment.

More information? Circle Item 15 on postcard, page 138.

Two-Stage Temperature Control

A control, type DA-435, with a single temperature sensing element operating two separate electrical circuits is available from The Mercoid Corp., Chicago, Ill.

The control has a single, remote stem, temperature-sensing bulb which operates two independently adjustable magnetic mercury switches. The adjustments are external, and the temperature at which each switch operates is shown on a calibrated dial.



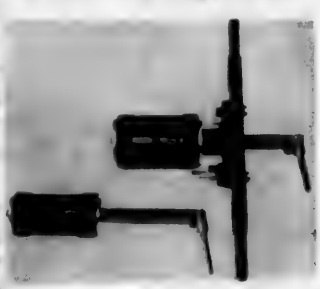
Three distinct operations for which the control can be used are: to close one circuit at high temperature and another at low temperature with both circuits open over the operating range; as an electrical interlock to open one circuit as the temperature rises above and the second circuit as the temperature drops below the set operating range; and to provide 2-stage control by opening or closing one circuit on a rise in temperature and a second circuit on a further rise in temperature.

The control can be furnished in 11 different operating ranges in a variety of steel cases to meet NEMA standards.

More information? Circle Item 16 on postcard, page 138.

Field Pipe Lathe

A field tooling lathe, No. 0913, for tapering 3-in. bituminized-fiber drain and sewer pipe has been developed and is being produced by Orangeburg Mfg. Co., Inc., Orangeburg, N. Y., pipe manufacturer.



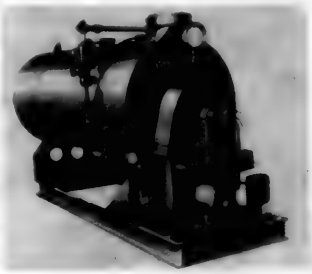
The company is also producing a field tooling lathe, No. 0934, for tapering 3 and 4-in. pipe. It is furnished with separate chucks for each size pipe. However, the same cutting handle is used for both pipe sizes by adjusting the cutter blade on the handle.

Both lathes are available from the company's dealers.

More information? Circle Item 17 on postcard, page 138.

Steam and Hot Water Generator

A boiler has been designed for industrial use by Cyclotherm Div., U. S. Radiator Corp., Oswego, N. Y. The unit is basically a hot-water generator, but a few adjustments can convert it to steam operation. Both the steam and hot-water phases operate automatically once the type of operation is selected. The combination steam - hot - water generator is designed for use in plants that are heated by hot water, but have occasional use for steam, such as steaming out tanks, de-greasing, and limited processing.



The unit operates on light oil, gas, or a combination of light oil and gas. It is rated as a 60-hp steam or hot water generator.

As a hot water generator, it generates 2,010,000 Btu per hr at a working pressure of 30 psi. It will deliver 2480 gal of hot water per hour with a 100-deg rise in temperature.

As a 60-hp steam generator, the unit delivers 2070 lb of steam per hour. Operating pressures ranging from 15 to 200 psi can be manufactured as standard equipment. On change over from hot water, the unit will deliver steam in 5 to 10 minutes.

To change over from hot water to steam operation, the operator shuts off the main hot water inlet and outlet, drops the water level in the boiler, and switches the control panel from water to steam control. The unit is furnished with dual control equipment as well as dual steam and hot water take-offs.

More information? Circle Item 18 on postcard, page 138.

Two Blower Arrangement

A possible solution of some of the warehousing and manufacturing problems of producers of warm air heating units and air conditioners is the dual Econo-Pak blower made by Lau Blower Co., Dayton, Ohio.

By joining two standard blowers together, air flow can be increased within the same height but with greater width. The dual arrangement is suitable for installations where it is impossible to mount one large blower but where it is necessary to have increased air flow.

The blowers' housing supports and hardware are furnished by the company. Since the purchaser can direct the blowers' air flow at any angle of discharge, he adds angle rails, two flexible couplings, and a make-up shaft as he wishes. Thus, he can produce his own custom installation using standard parts. A rigid coupling can be substituted for one flexible coupling.

The dual unit fits about 95% of blower requirements in the domestic heating and residential air conditioning fields. Five different standard pulley combinations are available, providing a speed range from 385 to 888 rpm per blower.

More information? Circle Item 19 on postcard, page 138.

Aluminum Belt-Drive Ventilator

A belt-driven aluminum centrifugal ventilator, which weighs 250 lb in the 16,500-cfm size, is introduced by Loren Cook Co., Berea, Ohio. Known as the Model BD ventilator, it is made in sizes from 1000 to 16,500 cfm. Its entire shell is made of aluminum, and it has an aluminum blower wheel.

By raising the hinged hood, the motor, which is non-overloading, and belt-drive can be inspected. With the hood closed, the motor is sealed from the air stream. By removing four bolts, the entire shell can be lifted off, exposing the blower wheel for cleaning purposes.

The ventilator requires a roof curb of 6 in., and has a relatively low silhouette. For example, the 16,500-cfm size is 41½ in. high.

To install the ventilator, the shell and base can be separated into two units by removing the four bolts mentioned above. This permits the use of light tackle in hoisting the ventilator to the roof.

More information? Circle Item 20 on postcard, page 138.

Integral Air Pump and Motor

A higher-capacity model in its recently developed line of integral air pump and motor units is available from Leiman Bros., Inc., Newark, N. J.

Designated as Model K-3, the new size provides a continuous vacuum of 28 inches of mercury at 20-lb pressure and has a 7.2 cfm displacement. Its overall size is 18½ in. long, 15 in. wide, and 7 in. high.

The ball bearing motor and rotary pump have a cast iron housing and two steel blades with a patented automatic adjuster to insure constant blade-to-wall contact. The unit is fan-cooled and mounted on rubber silencers, and the motor is equipped with automatic thermal overload protection.

The ball bearing greasing system requires attention once every 90 days, and the company's E-113 automatic lubricator operates 60 to 80 hours before requiring filling. It is equipped with an inlet filter and an outlet separator.

A smaller model, with the same construction features, continuous vacuum, and pressure, is available with a 3.6 cfm displacement and overall dimensions of 13½ in. long, 12 in. wide and 7 in. high.

More information? Circle Item 21 on postcard, page 138.

Improved Convector Units

Its improved CM and RM series of baseboard, wall-hung, and free-standing convector units are announced by The Convector Corp., Washington, D. C.

The CM series, which has a high capacity output, is applicable for schools, auditoriums, factories, churches, and hospitals. It is available with one, two, or three tiers of heating elements, depending on the specific requirements. The heating elements are made of copper tube with soldered aluminum spiral fins.

The RM series, designed to meet the requirements of small residences, is available in baseboard and free-standing convector models. There is a choice of two types of elements: round fin or Hi-fin, the difference being in the size and fabrication. The Hi-fin is of stronger construction and produces about 10% higher heat output.

The standardization and interchangeability of the units, parts permits three different applications by changing the end leg.

More information? Circle Item 22 on postcard, page 138.

Hoist Grab Lifts Bottles

A bottle grab for use with its Pacific hoist is being manufactured by Hoist Div., Burtchaell Heating Co., Portland, Ore.

The bottle grab is made in various sizes for different kinds of bottled gas cylinders. Another attachment available now is a barrel grab for use on steel drums.

The hoist has a capacity of 1000 lb and is operated by remote push button control. It requires power to lower or raise the load.

More information? Circle Item 23 on postcard, page 138.

Lightweight Drainage Tube

The manufacture of copper drainage tube, Type DWV, is announced by The American Brass Co., Waterbury, Conn. This tubing will be made to the standards developed and recently announced by Copper & Brass Research Association.

Type DWV, like Type M copper tube, is recommended for interior sanitary drainage systems, but is lighter and has a thinner wall. The reduction in wall thickness varies according to the size of the tube.

The tube is supplied, hard temper, in 20-ft straight lengths. The lighter weight, an advantage in handling and assembling, is considered conservative by the company because pressure for this use is not a problem, and corrosion is negligible. Both types are recommended for interior use only. When drainage lines are laid underground heavier copper tube should be used because the thicker wall will reduce chance of damage by careless back-filling, and it will provide additional protection when ground conditions are corrosive.

The copper drainage tube is designed for use with standard solder-type cast bronze drainage fittings. The OD of the new type is the same as Types K, L, and M, size for size.

More information? Circle Item 24 on postcard, page 138.

Two Men Can Hoist 4000 lb

A two-man hoist that can lift 4000 lb up to 18 feet is being marketed by Hastings Air Control, Inc., Omaha, Neb.

The 2500-lb unit has been used by the company's dealers for lifting air conditioners and is being made available to other trades for a variety of uses. It can be used for lifting compressors, condensers, unit heaters, heavy radiators, and other types of equipment that are suspended from the ceiling or set on platforms.

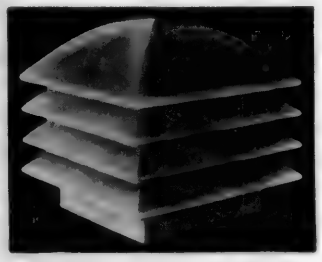
The hoist has three sets of pipe supports, welded to the hoisting brackets, through which 1-in. pipes are inserted. The equipment to be lifted is placed upon the pipes, or planks can be placed on the pipes to form working platforms for plumbers, sheet-metal workers, and others to install the equipment.

The lifting is effected by the ratchet-like action of the hoists on each side of the unit. The hoists pull themselves and the equipment up the 18-ft lifting chains a few links at a time with each pull of the levers.

More information? Circle Item 25 on postcard, page 138.

Power Roof Ventilators

Power roof ventilators have been designed by Roof Ventilator Div., Atmos Corp., Chicago, Ill., to blend with modern architectural styling. The design of the ventilators is called Modular by the company.



Viewed from the top of the ventilator, seven basic sizes are available, ranging from 30 x 30 in. overall for the smallest and increasing in 6-in. increments to the largest size of 66 x 66 in. Each of the seven sizes is available in height increments of 5½ in. As a specialty the company will provide the ventilator in any length or height for roof monitors, roof ridges, or slit openings.

The capacities of the ventilators range from 550 to 20,000 cfm in both the propeller and centrifugal type of power section, using direct and belt drive arrangements.

More information? Circle Item 26 on postcard, page 138.

Cooler's Capacity Increased

Its 1955 drinking water coolers are being made with cooling capacities from 5.2 to 27 gal per hr, at standard rating conditions, by Temprite Products Corp., Birmingham, Mich.

The satin-finish, stainless steel top has a deeper basin. This feature combined with the anti-splash guard and automatic water control prevents splashing and spurting.

Now offered as standard equipment on the pressure bubbler type coolers is a dual water flow control which offers both finger-tip button operation and foot pedal control, thereby enabling the user to start the water flow with his finger or a touch of his toe.

An additional feature of the coolers is their dual thermostats, now also standard equipment, which provide accurate temperature control and insurance against the possibility of accidental freeze-up.

More information? Circle Item 27 on postcard, page 138.

Maintenance Linings

Chemical resistant coatings and linings for plant maintenance are introduced by Corrosion Control Co., Inc., New York, N. Y.

Called Neocor, the Neoprene-based coatings are made in two series that cure at room temperature.

Series C-10 is a spray or brush coating that is resistant to chemical spills, fumes, and drips throughout a temperature range of –20 to 275 deg F. Brushed-on coats of this series give a dry film thickness of 4 to 5 mils per coat. Its standard colors are black, light grey, dark grey, red, and aluminum.

Series HD is also a spray or brush coating but with a greater effective temperature range, namely, from –65 to 300 deg. Brush or spray applications of this series give a film thickness of 20 to 30 mils per coat.

Both series are packaged in 1-gal cans, 5-gal pails, and 55-gal drums.

More information? Circle Item 28 on postcard, page 138.

Valve Handle Guard

A brass shield, called Valguard, for protecting the flush valve assemblies of urinals or water closets is introduced by Valguard Co., Port Deposit, Md.

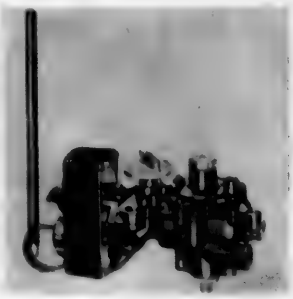
The guard is for use on a pivotal valve handle. It is a brass casting with a chrome finish. It is designed to fit over the handle housing, and is held in place by two chrome plated steel Allen screws. With the guard on it, the valve handle can be moved only with the thumb or fingers.

The guard is intended to protect the valves from the damage and unnecessary wear caused by improper and abusive use, such as kicking.

More information? Circle Item 29 on postcard, page 138.

Heater Control Accessory

Automatic control for gas heating installations is available to users of the model 55 Gasapack through the use of the 55 MTS modulating snap thermostat accessory developed by A-P controls Corp., Milwaukee, Wis.



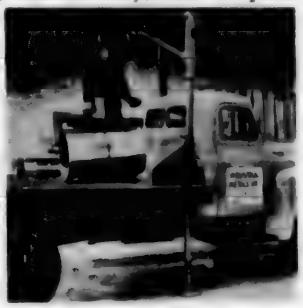
The accessory (left) can be attached to the basic control (right) by means of four screws without the necessity of breaking the line. It is operated by a sensitive thermo-bulb which modulates the fire from high to low. The unit then quietly snaps off when the temperature maintained over-rides the requirements and a low fire is no longer required. The manufacturer promises users quiet operation with no fluttering, humming, or popping flame.

The heater control and the accessory are designed for modern high-efficiency gas equipment. Manufacturers will appreciate the economical installation and operation of the self-contained unit which actually comprises five controls. They include a built-in pressure regulator for city gas, a large pilot filter, an automatic pilot, and main and pilot shutoffs.

More information? Circle Item 30 on postcard, page 138.

Electric Truck Hoist

Economy in delivery and material handling is the purpose of the model 1000 electric Hoist-O-Matic truck crane produced by Hoisters, Inc., Kansas City, Mo. A push button control permits one man to do the work of two or more.



The crane can be operated within a radius of 8 ft from its center, and handle loads up to 1000 lb. It can be stopped at any height by its automatic brake. The 4-ft boom of the crane has a 360-deg traverse, and revolves on hardened-steel rollers and a thrust bearing plate. The crane is 6 ft high.

The power unit is mounted in the base of the crane to simplify installation and service. The crane requires 18 x 23 in. of mounting surface, and can be mounted anywhere on the truck bed. Its sheaves reduce cable wear and eliminate cable setting. The 50-ft cable can be used for load skidding operations, as well as freight hoisting.

The crane's installation requires drilling 5 holes and connecting the electric cables to the truck battery. It is designed as a general purpose loading unit for such services as compressed gas companies; construction contractors; governmental service agencies; general delivery services; farm equipment dealers; and plumbing, heating, boiler, and septic tank services.

More information? Circle Item 31 on postcard, page 138.

Cast Iron Baseboard

Where building design or exposure conditions require a high heat input, the No. 9 cast iron baseboard of Weil-McLain Co., Michigan City, Ind., provides the necessary capacity without a sacrifice of appearance.

Rated at 3.35 sq ft per lin ft, the baseboard's installed height and width are 9-3/4 x 2-1/4 in. respectively. They have large waterways that sustain flow of both radiant and convected heat. The baseboards are available in 6-in. increments, to permit a better utilization of wall space. Legs on the end sections automatically position the baseboard against the wall and prevent sagging. They are shipped assembled in lengths of 6 ft or less, ready to install.

A complete line of metal trim is provided by the company.

More information? Circle Item 32 on postcard, page 138.

Thermal Insulation Cover

A protective coating for thermal insulation, called Lagz, has been developed by West Chester Chemical Co., West Chester, Pa. Compounded from Neoprene, silicone rubbers, and other resins, the coating is unaffected by moisture, oils, brine, solvents, corrosive gases, and weathering.

The coating is made in two grades, designated Nos. 1 and 2. No. 1 is a medium viscosity material for use with 85% magnesia, calcium silicate, felt, rock wool, and asbestos. It is applied by spraying, brushing, or sponging. No. 2 is a high viscosity material for use with low temperature insulation such as cork, foamed plastics, glass fiber, and cellular glass. It is applied by brush or trowel and serves as a vapor barrier.

More information? Circle Item 33 on postcard, page 138.

Close-Coupled Pump Motor

Totally-enclosed and explosion-proof, close-coupled pump motors have been developed by U. S. Electrical Motors, Inc., Los Angeles, Calif. Designed specifically for use with centrifugal pumps operating in dangerous, damp or dusty locations, the motors are avaliable in horsepowers ranging from 1½ to 25 hp.

Special features of the motors include a face-type, registered mounting bracket for shaft alignment and pump mounting, a ground shaft for pump impeller mounting, and solid flange and brass slinger for liquid deflection.

The totally-enclosed models are sealed for use in locations where destructible dusts, acid fumes, excessive moisture, or other harmful substances prevail. Motors with larger ratings are double-enclosed and fan-ventilated for heat dissipation. Those with smaller ratings are self-cooled by radiation.

The explosion-proof models are certified by Underwriters' Laboratories, Inc. They are fitted with a sealed conduit box, elongated bearing sleeves, a sparkproof aluminum fan, and long bracket registers.

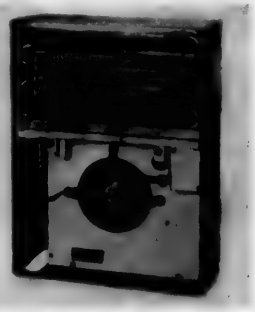
The complete line of pump motors has asbestos-protected windings, normalized castings, lubrication of bearings, and a solid cast rotor.

More information? Circle Item 34 on postcard, page 138.

Improved Forced Water Unit

An improved model of the Air-rad, a forced water heating-cooling unit, is announced by Penn Boiler and Burner Mfg. Corp., Lancaster, Pa.

The unit offers the advantages of hot water heat and summer air conditioning from the same radiator unit without any changes in piping. They operate equally well on 1 or 2-pipe systems. A chilling unit need not be included with the original installation but can he added later.



With the system, zoned or individual room temperature control can be had. Fractional cooling is also possible, permitting savings in the original cost of the air conditioning unit.

The units are suitable for modernization as well as new construction. They fit between standard studs and are adjustable for varying wall depths. Fittings are adaptable for ¾ or ⅝-in. tubing and are staggered for easy installation. Tie-in lines can be soldered before installation. Built-in electrical connections are accessible. A filter unit covers the air inlet opening.

They are available in two sizes. Model 10-R (illustrated) has a heating capacity of 10,000 Btu per hr with 200-deg water and a cooling capacity of 5000 Btu per hr with 42-deg water. Model 22-R, approximately twice as wide as Model 10-R, has a heating capacity of 22,000 Btu per hr with 200-deg water and a cooling capacity of 10,000 Btu per hr with 42-deg water.

More information? Circle Item 35 on postcard, page 138.

Thread Compound Is Improved

Fel-Pro C-5 Hi-Temp thread compound for stainless steel and high temperature applications up to 1800 deg F has been improved by Felt Products Mfg. Co., Chicago, Ill. It is used to prevent galling and seizing of studs, bolts and threaded assemblies, and as a preventive for galvanic pitting of stainless steel.

The compound is formulated on a colloidal-copper base in a non-volatile and viscous carrier, and, in effect, copperplates metal to prevent direct contact. It is non-corrosive, and is especially effective where dissimilar metals of the latest alloys are joined.

More information? Circle Item 36 on postcard, page 138.

(*Continued on page* 126)

St. John The Baptist Church

Rome, N. Y.

Architect: FRANK W. BRODRICK, Syracuse, N. Y.
Engineer: MALCOLM B. MOYER, Syracuse, N. Y.
Gen. Cont.: JAMES PAOLINI CONST. CO., INC., Syracuse, N.Y.
Heat Cont.: O'SHEA SUPPLY CO., INC., Rome, N. Y.

ANOTHER CASE OF COPPER WHERE IT COUNTS

The beauty of heating a church by radiant panels is that traditional as well as modern architectural design may be used without having to make allowances for outlets or radiators in your design. It is the number one method of heating churches and similar permanent structures. And, when installation is completed panels are invisible. Also, when Revere Copper Water Tube is used it is easily and readily installed, easy to bend, requires no thread cutting and the solder or compression fittings used are readily made. There are fewer of these fittings and they are tight, trouble-free fittings when finished.

A radiant panel heating system of Revere Copper Tube is a long-lasting one, too, which is mighty important in a permanent structure such as a church. For copper tube cannot rust, its endurance has been proved for centuries.

So never mind what the other fellow says . . . *you* keep out of trouble with copper. Use Revere Copper Water Tube for radiant panel heating, hot and cold water lines, underground service lines, processing lines, waste stack and vent lines. Your Revere Distributor has plenty of stock these days, in all the required sizes.

IN THE LARGE PHOTO ABOVE NOTE THE NEAT LAYOUT, the even, easily-bent lengths of Revere Copper Water Tube, the few number of fittings . . . only every 60' in the panels. 5,000 ft. of tube was used in sizes ranging from ¾" to 1⅛". The architect and contractor tell us that the suggestions made by one of Revere's Technical Advisors were most helpful in both the planning and installation stages. Why don't you take advantage of this service? No obligation, naturally.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

• • •

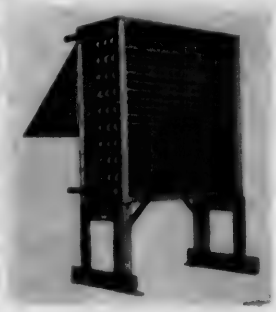
Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N.Y.—Sales Offices in Principal Cities, Distributors Everywhere.

(*Continued from page* 124)

Air-Cooled Condensers

Air-cooled condensers are being produced by Peerless of America, Inc., Chicago, Ill., in a series which the company calls the Hi-F NW series.

The condensers, which use no water, are available for indoor or outdoor installations. They are made in unit sizes to 10-ton capacity and with stands to accommodate multiple units to 40-ton capacity.



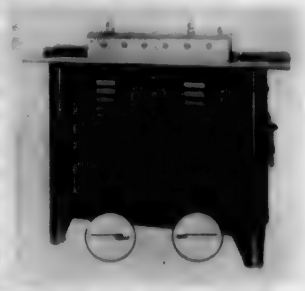
Maintenance problems, such as water hardness, the deterioration of wet surfaces, winter conditions, and difficulties with floats and valves have been considered by the company in the design of the condensers. Another problem which prompted the production of the air-cooled series is that arising during water shortage seasons from local ordinances restricting the use of water.

Bulletin No. NW155 gives detailed information about the air-cooled units.

More information? Circle Item 37 on postcard, page 138.

Duct Snap Lock Machine

A snap lock machine has been designed for sheet metal shop use by Lockformer Co., Chicago, Ill. The unit fabricates both receiver lock and offset lock, for both round or square duct and, since the lock is made on flat sheet, there are no restrictions as to the diameter of pipe or size of duct.



The unit fabricates metal from 24 to 30 gage, operates on standard 110 or 220v, and can be operated by anyone after a five-minute explanation.

More information? Circle Item 38 on postcard, page 138.

Natural Gas Air Conditioner

A patented natural-gas-driven powering device, intended to save on operating costs of air conditioning and refrigeration compressors, will be put on the market this year by Cobell Industries, Inc., Fort Worth, Tex.

The first units are expected to be delivered by fall. Research and development of the invention is completed.

The device is expected to make possible a natural-gas-powered reciprocating air conditioning system that is automatic in operation, and will operate under excessive temperatures throughout the season. It is primarily designed for residential and commercial air conditioning systems of 2 to 10 tons, and will operate equally well with bigger units. The unit works in connection with standard compressors.

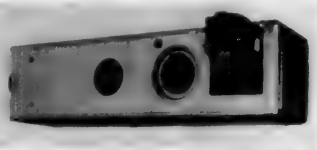
In the past, natural-gas-powered compressors have been deemed impractical for residential systems, since ratios of horsepower per one ton of air conditioning have been generally 3 to 1. The new gas-powered mechanism will operate at its full rated capacity using one brake horsepower of natural gas engine to one ton of refrigeration under typical summer conditions of 95 deg d.b. and 75 deg w.b.

More information? Circle Item 39 on postcard, page 138.

Commercial Size Oil Furnace

The addition of the No. OY-224-E high capacity oil furnace to its Luxaire Line of heating and cooling equipment marks the entry of C. A. Olsen Mfg. Co., Elyria, Ohio, into the commercial and industrial heating field.

With a firing rate of 2 gal per hr, the horizontal furnace is rated at 224,000 Btu per hr output at the bonnet. A gun type, pressure atomizing, vortex-action, oil burner fires a cylindrical type combustion chamber. Forced air circulation is supplied by a 12-in., ½ hp blower at a rate of 2800 cfm. Air discharge and intake openings are 28 x 28 in., and two 20 x 25-in. filters are used.

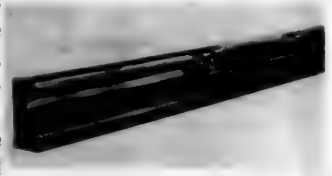


The unit is 102½ in. long, 32 in. wide, and 32 in. deep, and will be shipped in 2 sections. The section containing the heat exchanger will be factory assembled. The section containing the blower can be secured together at the time of installation. The unit can be suspended from 4 points, either from above or below.

More information? Circle Item 40 on postcard, page 138.

Diffuser Has Damper Control

An automatic pushbutton damper control is a feature of the Series 70, 4-ft and 2-ft perimeter baseboard diffusers offered by The Lima Register Co., Lima, Ohio, at no increase in price. The feature is an engineering development which provides a finger-tip control of the air in heating and cooling, and an air shut-off control.



By pushing in on the pushbutton, the hinged damper, running the full length of the louver openings, automatically opens and locks into the pre-balanced position. By pushing up, it automatically snaps closed with a spring action for full air shut-off.

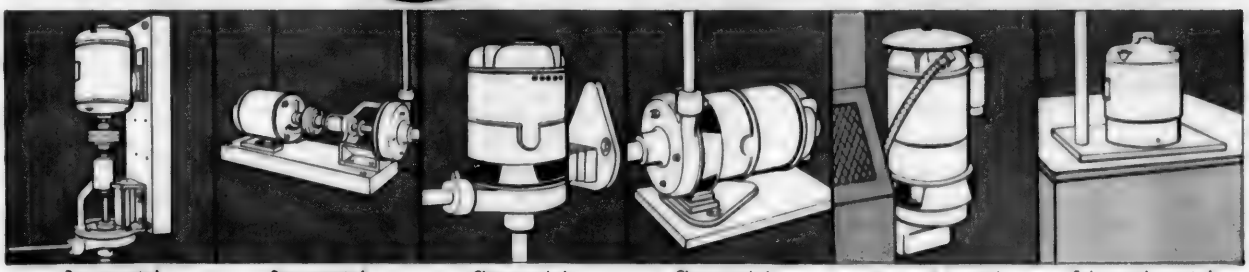
The balancing is rapid in either the open or closed position. The pushbutton adjusting screw can be turned with the fingers to the correct valve setting for proper balance. The spring tension eliminates rattling and keeps the valve from being forced closed by the air velocity. The baseboard diffusers are shipped completely assembled, including the built-in mechanical damper and pushbutton control mechanism.

More information? Circle Item 41 on postcard, page 138.

(*Continued on page* 128)

ALLIS-CHALMERS
Air Conditioning
PUMPS

One Pump ...6 Mounting Methods



Base mounted, vertical | Base mounted, horizontal | Close-coupled, vertically mounted | Close-coupled, horizontally mounted | Tank wall mounted | Submerged mounted

makes easier installation for you

YOU CAN SOLVE MANY DIFFICULT INSTALLATION problems by using Allis-Chalmers air conditioning pumps. You can get a single set of operating characteristics using four different models that can be installed in any of six different ways. You can choose the mounting method easiest for your job without having to figure a different pump each time.

Engineering Assistance

Your Allis-Chalmers representative or distributor is an experienced, highly qualified specialist who will give you full cooperation every step of the way. He'll help you pre-engineer the setup. Many times he can make valuable suggestions which will result in a simpler, more effective installation.

Delivery from Convenient Stock

Allis-Chalmers air conditioning pumps in a wide range of types and sizes are carried in stock by Regional Warehouses and Authorized Distributors throughout the country. A-4577

Electrifugal is an Allis-Chalmers trademark.

For literature on Allis-Chalmers
FHP Package Pumps get Bulletin 5287529 . . . *Electrifugal* Pumps, Bulletin 5286140 . . . Supporting Adaptor Pumps, Bulletin 5286083 . . . Vertical Mounted Pumps, Bulletin 5286975. Write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-C ALLIS-CHALMERS

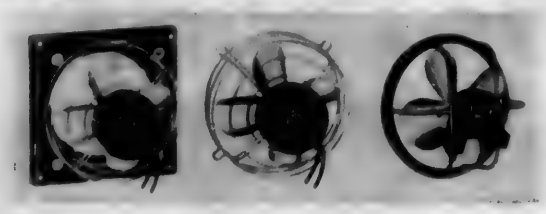
ALLIS-CHALMERS

(*Continued from page* 126)

Ventilators Sold Nationally

Ventilating equipment, including exhaust fans, roof ventilators, and small blowers for commercial and industrial use, is introduced nationally by Trade-Wind Motorfans, Inc., Rivera, Calif. The equipment has previously been sold in the far western market only but will now be handled by all the company's representatives from coast to coast.

A range of propeller type exhaust fans (illustrated) from 115 to 17,850 cfm is available for side wall and window installation. The selection of fans includes direct-connected and belted fans, and panel, basket and back plate fans. Totally enclosed motors, air impellers, and angle steel frames are characteristic features of the equipment. The units are being sold under the trade name of Air Wave fans.



The company's L-blow roof exhausters are packaged ventilators for use where large air volumes must be exhausted with low static resistance. Their sizes range from 1290 to 19,000 cfm at 0.00 static pressure. The exhausters are designed with the motor outside the air stream so that heat, dirt, explosive fumes, or other contaminates cannot reach it.

Small conventional blowers which are also being introduced by the company are used for cooling, drying, and exhausting where a relatively large volume of air is to be exhausted with low horsepower. They have been used for such diversified applications as cooling electronic equipment and providing fresh air for seamen below deck. Direct-connected blowers are available with rated horsepower from 1/25 to 1½ and with cfm ratings from 220 to 2510.

Bulletin 245 describes the complete line and is available from the company.

More information? Circle Item 42 on postcard, page 138.

Valve Works Like a Clamp

A diaphragm valve, made of Koroseal, is announced by The B. F. Goodrich Co., Industrial Products Div., Akron, Ohio.

Of simple design, the valve is recommended for handling slurries, fluids, gases, and corrosive materials at temperatures to 150 deg F and pressures to 150 lb.

The valve works like a simple pinch clamp and is closed by pressing a flexible diaphragm against the raised bottom, which is curved to fit the diaphragm. When fully closed, the diaphragm is seated under pressure providing a cushioned, leak-proof seal. The absence of pockets, corners, grooves, and sharp changes in direction of flow makes the valve self-cleaning.

The company says that its valve does not require packing because the diaphragm seals off the valve stem and working parts from the solutions. No fluid can get to the stem to corrode the metal working parts so no special alloys are needed. This prevents contamination of the product in the piping system and keeps lubricants from getting back into the product.

The valve is available in the following sizes: ½, ¾, 1, 1¼, 1½, and 2 in.

More information? Circle Item 43 on postcard, page 138.

Portable Psychrometer

A portable electric psychrometer, which is slightly more than 7 in. long, has been developed by GM Mfg. Co., New York, N. Y. The instrument is an addition to the company's other Gemware products.

A pair of matched thermometers are used in the psychrometer for measurements to within 0.5 deg F. A small instrument, it weighs approximately one and a half pounds and is powered by standard D flashlight batteries.

The thermometers can be replaced by removing the cover with the lucite plate; the side plate is removable for inserting new batteries. A reservoir is fitted inside the case so that a continuous water supply feeds to the wet bulb wick. A slide rule (not shown in photograph) for determining relative humidity is a component part of the case.

The company is also producing a deluxe model with a flashlight bulb inside the thermometer cover and two spare thermometers fitted inside the case.

More information? Circle Item 44 on postcard, page 138.

Acetylene Torch Outfit

Complementing its present line of LP-gas torches, Ransome Co., Emeryville, Calif., has developed a multi-purpose acetylene torch outfit.

Designed to cope with increased silver soldering applications in the plumbing field, it is, nevertheless, fast enough for the refrigeration trades. The torch also has copper heads suited for sheet metal work. The outfit includes two handle assemblies and seven different head styles. The regulator is solid brass, and, available with the outfit, is a Bunsen burner which will work on the torch handle or separately as a unit with its own valve.

An illustrated catalog sheet and price list are issued by the company.

More information? Circle Item 45 on postcard, page 138.

(*Continued on page* 130)

BARBER COLMAN

ELECTRIC-ELECTRONIC

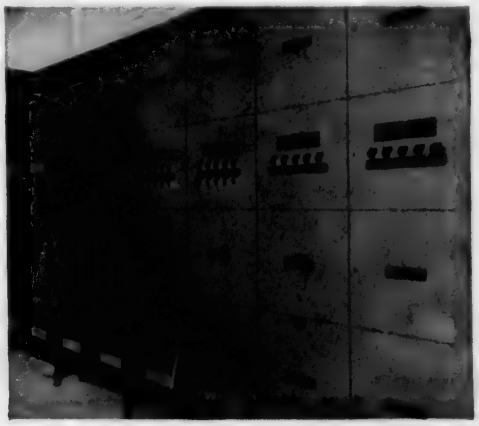
Control Centers

In Milwaukee, Wisconsin Telephone Company engineers specify <u>better</u> control . . . electrically

Electric-electronic controls have been specified again by telephone engineers . . . this time in Milwaukee for the new and existing Headquarters buildings of the Wisconsin Telephone Company. Electric-electronic controls are used throughout the new six-story addition (foreground), completed late in 1954. Modernization of the nineteen-story older building is in process — electric-electronic controls have been installed on eight floors to date. The speed, flexibility, accuracy, and reliability of electrical equipment were big factors in the selection, plus savings on original cost of the controls, installing labor and materials, and maintenance.

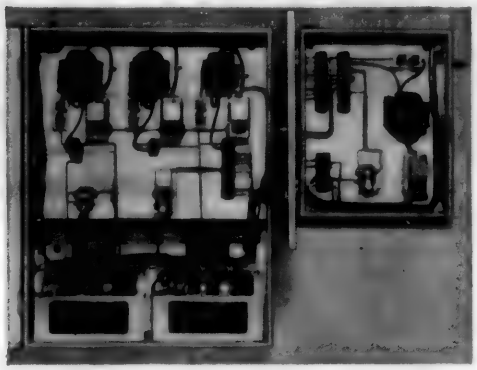
Architects (both buildings): GRASSOLD-JOHNSON & ASSOCIATES. *Consulting Engineer* (new building): JOSEPH VOLK, deceased. *Consulting Engineers* (remodeling old building): LOFTE & FREDERICKSEN. *Heating Contractors* (both buildings): PAUL J. GRUNAU CO. *Ventilating Contractors* (both buildings): REINKE & SCHOMANN, INC.

In new addition, all radiators, convectors, and reheat coils are individually controlled with electronic outdoor reset on the hot water supply. Remodeled building has Barber-Colman controls for ventilation, reheating coils, and direct radiation.

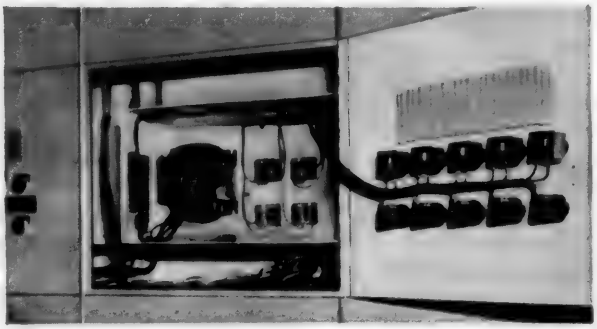


Modern "Control Center" (above) in remodeled building serves as central junction box, houses prewired accessories, numbered terminal strips, indicating lights, remote starting buttons, etc. A Uni-Flo "VF" Grille provides ventilation of each compartment.

Another "Control Center" (below) in new building serves as "nerve center" to speed field installation, expedite checking, simplify revisions and servicing. It's the fast, cost-saving method for modern buildings.



(Below) **One of twenty-four** compartments comprising the 8' x 16' "Control Center" in remodeled building. This type of installation exemplifies latest cost-saving techniques in automatic control system engineering.



Rapid response of electronic controls appealed particularly to the telephone engineers. Controls for the lobby compensate instantaneously for heat loss through front doors. Controls on fresh air supply adjust mixture continuously for improved comfort conditions. "Better control . . . electrically" is now practicable for most installations in large or small buildings. Phone your nearby Field Office, or write us for data, prices, and expert engineering service on any automatic control problem.

Barber-Colman Company

DEPT. Q, 1302 ROCK ST., ROCKFORD, ILLINOIS, U. S. A.

Field Offices in principal cities

Automatic Controls • Air Distribution Products • Industrial Instruments
Aircraft Controls • Small Motors • Overdoors and Operators • Molded Products • Metal Cutting Tools • Machine Tools • Textile Machinery

(*Continued from page* 128)

Globe-Type Solenoid Valves

Packless, globe-type, solenoid valves, Type K, are produced by J. D. Gould Co., Indianapolis, Ind., with stainless parts. The parts made of stainless steel are those that come into contact with the liquid media that passes through the valve.

The valves, available in ½, ¾, and 1-in. sizes, are piston-pilot operated and have full port openings which will operate over a wide pressure range. Renewable discs, made of Teflon, are standard equipment of the valves.

Both waterproof molded coils for temperatures to 250 deg F and glass insulated, silicone impregnated coils for higher temperatures are offered by the company for the valves. The coils are interchangeable between the different sizes.

More information? Circle Item 46 on postcard, page 138.

Trucks Feature V-8 Engines

One-hundred-twenty-eight 1955 truck models, featuring units that are powered by V-8 engines and major styling and engineering improvements, are announced by GMC Truck & Coach Div., General Motors Corp., Pontiac, Mich.

More than doubling the number of models offered in 1954, the company offers 74 new light, medium, and heavy-duty vehicles to meet trucking industry needs from ½-ton pick-ups to 5-ton tractors.

Two different V-8's have been developed to meet hauling needs. The 288-cu in. engine for light and medium-duty trucks develops 155 hp and the 324 engine for medium and heavy-duty vehicles 175 hp.

All of the 6-cylinder gasoline engines have been increased in power. The horsepower of the 248 engine has been raised from 125 to 130; the 270 engine from 137 to 140; the 302 engine from 145 to 155; the 360 engine from 155 to 170; the 426 engine from 177 to 190; and the 503 engine from 200 to 225.

Due to a demand for trucks with automatic transmissions, the number of models equipped with the Hydra-Matic transmission has been raised from 13 in 1954 to 65 in 1955.

Styling advances include hidden running boards, a streamlined grille, header bar and bumper assembly, a two-cluster instrument panel positioned directly in front of the driver, cadet peaks over headlights and windshields, and a new ventilating system.

Thirteen exterior colors are available and optional equipment consists of such drivers' aides as electric windshield wipers, left-hand door locks, wrap-around rear windows and tinted glass. In the light-duty 100 series, tubeless tires are standard equipment.

An engineering improvement is the development of a hold position in the 8-speed Hydra-Matic transmission for medium and heavy-duty trucks. Previously this position, a setting for increasing the performance of the vehicle and for using the engine as a brake, was available only in heavy-duty trucks equipped with twin Hydra-Matic transmissions.

More information? Circle Item 47 on postcard, page 138.

Induced-Draft Cooling Tower

An induced draft cooling tower, the Hideway, is available in ratings from 2 through 15 tons from Toungate & Coats, Austin, Tex.

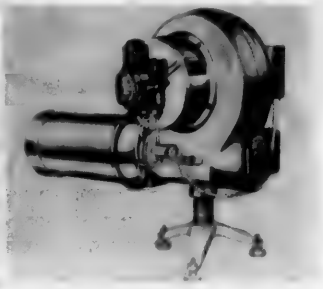
Adaptable for both residential and commercial installation, the tower features clear heart redwood construction to reduce corrosion and the chemical reactions of water. Its distributing pan and deck are held with galvanized bolts, and its other fittings are also galvanized. It has a 220-v, single phase motor and stamped aluminum fan blades pitched at 25 to 35 deg to reduce noise. The water distribution in the tower is by gravity flow.

The tower is shipped completely assembled, including fittings and float valve.

More information? Circle Item 48 on postcard, page 138.

Commercial Oil Burner

A heavy-duty, pressure atomizing, commercial oil burner, with a capacity of 20 to 30 gal, is announced by Iron Fireman Mfg. Co., Cleveland, Ohio. The burner is known as Model C-3 and is approved for firing No. 2, or lighter, oil.



Some features of the burner are a heavy-duty choke ring, a cast iron frame, a sealed motor, and electronic combustion controls. The burners are designed to permit adjustment of the nozzle position while in operation; this allows setting the burner for maximum combustion efficiency and for the most suitable flame shape.

The motor is totally enclosed and has sealed bearings, lubricated at the factory. It is covered by a five-year warranty.

An instantaneous cutoff and delayed-opening valve on the fuel unit operates in conjunction with the electronic safety control. Both the motor and safety controls are produced by the company's Electronics Division.

More information? Circle Item 49 on postcard, page 138.

(*Continued on page* 132)

designed and priced for every application!

MODINE . . . recognized leader in convector design . . . now offers the broadest line available. There are 30 types, 8000 sizes . . . a convector for every application.

Superlatively styled . . . yet budget-priced . . . this beautiful new convector line is quality-built in every detail. It's the result of over 25 years of convector manufacture, skilled craftsmanship and experienced convector engineering . . . plus entirely new production facilities at the Modine Racine (Wis.) plant.

Before you specify or buy convectors be sure to find out about the new Modine line. For complete details, call the Modine representative listed in the classified section of your phone book or write Modine Manufacturing Co., 1588 DeKoven Ave., Racine, Wis.

30 types • 8000 sizes

There's a Modine Convector to meet your exact needs: Deluxe, standard and institutional models — free-standing, fully and partially recessed, concealed and wall-hung types with many design variations.

Modine

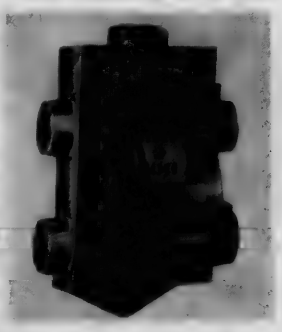
CONVECTOR RADIATION

R-1256

(*Continued from page* 130)

Air Filter Gage

An air filter gage has been designed for industrial and commercial ventilating and air conditioning systems by Bacharach Industrial Instrument Co., Pittsburgh, Pa. The gage provides continuous monitoring of the dust removal efficiency of air filters. It operates on the principle of differential pressure measurement. When the pressure differential across the filter due to dirt accumulation becomes excessive, a signal vane behind the dome-shaped window of the gage flips up into view displaying the words, renew filter, on an orange background. The signal, once actuated, remains visible regardless of whether the blower operates until the gage is reset after the filter has been cleaned or replaced.



The gage is adjustable for any kind of ventilating or cooling system and any kind of filter. Adjustments can be made on the job to operate the gage on desired pressure differences between 0.06 and 3.5 inches of water differential pressure. Other ranges are available up to 10 inches of water.

The gage has a built-in electric switch to operate a signal light or alarm which can be remotely located from the gage. It also has a calibrator for setting the gage on the job if the manufacturer's specifications of maximum allowable filter resistance are not available. By means of this calibration adjustment, the renew-filter signal is automatically actuated when the pressure across the filter has increased to twice the pressure differential when the filter is clean.

Complete particulars of the gage are given in Leaflet 854.

More information? Circle Item 50 on postcard, page 138.

3-Inch Aluminum Insulation

An improved thermal insulation has been developed and put into production by Infra Insulation, Inc., New York, N. Y., makers of multiple aluminum insulations. The insulation is called type 6PS and is recommended for use in the ceilings, roof spaces, and crawl spaces of cold storage and air conditioned structures.

The improvement to the insulation is an increase of the top inner space to an inch clearance above the peaks of its accordion fiber pleats. This further reduces heat flow by convection and conduction.

The top sheet of aluminum is separated by 1¾ in. from the center aluminum sheet, on which rests an accordion fiber ¾ in. deep. Underneath, there is an additional sheet of aluminum 1¼ in. below. The final result is a 3 in. deep, multiple-layered aluminum, fiber, and air space insulation.

The insulation imposes a barrier, against radiation, of successive aluminum sheets, each of whose surfaces has 97% reflectivity and 3% absorptivity and emissivity, for heat rays or radiation.

Made for 16 and 24-in. centers, the insulation is packaged in cartons that contain 250 sq ft of insulation and weigh 34 lb. The value of reflective air spaces as thermal insulation is discussed in a booklet available from the company.

More information? Circle Item 51 on postcard, page 138.

Five-Hp Air-Cooled Unit

A 5-hp air-cooled condensing unit, designed to provide waterless air conditioning for commercial buildings and large residential installations, is announced by United States Air Conditioning Corp., Minneapolis, Minn.

The equipment, which can be used to provide cooling alone or to convert an existing warm air heating system to all-year air conditioning, is applicable in localities where water is scarce or costly, or waste water disposal presents a problem.

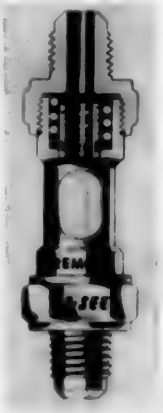
Offering the same installation and operational advantages of the 2 and 3-hp Kooler-aire units, which were introduced earlier this year, the unit is remotely installed and used in conjunction with a housed, direct-expansion, cooling coil or coil and blower combination. Its component parts include a compressor, motor, receiver, and condensing coil. Copper tubing carries the refrigerant to and from the cooling coil, which is installed in the duct air distribution system.

Air-cooled condensing units can be installed either inside or outside the building, with sufficient air circulation the only requirement.

More information? Circle Item 52 on postcard, page 138.

Spring-type Indicators

The hermetically-sealed E-Z-See indicators of Remco, Inc., Zelienople, Pa., are being supplemented by liquid and liquid flow indicators with spring compensated gaskets. The company now offers both hermetically-sealed and spring-type indicators to the air conditioning and refrigeration industry.

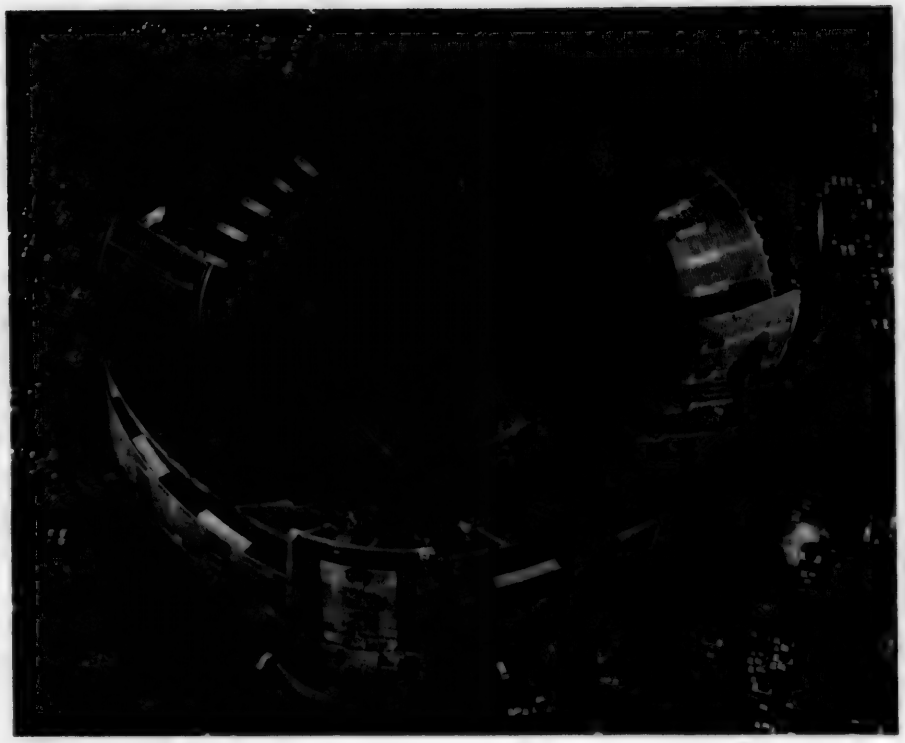


The spring-type indicators, Types 277 and 377, have large double-port, oval viewing openings, which allow ample light for diagnosis by the service engineer. They have heavy brass bodies and 1-in. hex brass end fittings for installation convenience.

Type 277 liquid indicators are available with ¼, ⅜, ½, and ⅝-in. male-and-male or male-and-female flare fittings. Type 377, which is equipped with the flow indicator, is available in male-and-male or male-and-female flare sizes ¼, ⅜, and ½-in.

More information? Circle Item 53 on postcard, page 138.

(*Continued on page* 134)



Hundreds of feet of Beth-Co-Weld Pipe are used in the heating and plumbing lines at Baltimore's Memorial Stadium, home of the Baltimore Orioles. *Mechanical Contractors (first phase):* The George H. Schuman Co., Inc.; *(second phase):* H. E. Crook Co., Inc., both of Baltimore; *Pipe Jobbers:* Schumacher & Seiler and J. T. Roberts & Bro., Inc., Baltimore.

Recent Construction with Beth-Co-Weld

Whether the job is small or large, residential or industrial, you'll do well to use Beth-Co-Weld steel pipe for heating and plumbing lines.

Beth-Co-Weld is ideal pipe for general-purpose piping because it's made from sound steel by the continuous-weld process. Beth-Co-Weld is uniform, too—uniform in quality, in physical characteristics, and in strength of weld.

Your jobber furnishes Beth-Co-Weld in sizes from ½ in. to 3 in., standard weight and extra strong, in 21-ft lengths, plus or minus 1 in. He also supplies it in 3½ and 4 in., standard weight only, in lengths of approximately 22 ft.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

This Lockheed Aircraft Service-International facility at New York International Airport has Beth-Co-Weld Pipe in its heating and fuel-line piping. *Contractor:* J. E. Schocter Corp., New York; *Jobber:* Chas. F. Guyon, Inc., New York.

Men's Residence Hall at Florida State University, Tallahassee, has heating and plumbing lines of Beth-Co-Weld steel pipe. *Pipe Jobber:* The S. B. Hubbard Co., Jacksonville, Fla.

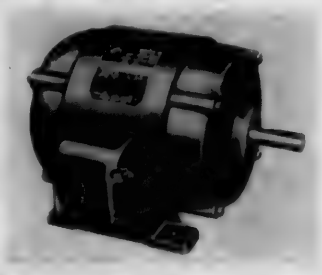
BETHLEHEM STEEL

BETH-CO-WELD STEEL PIPE

(*Continued from page* 132)

Motor Frames Made Smaller

Industrial a-c motors with smaller frame sizes are being built to NEMA standards by The Lima Electric Motor Co., Lima, Ohio.



Currently, all standard ratings are available in frame sizes 182, 184, 213, and 215. The balance of the motors, up to and including 30 hp, is being processed on an accelerated schedule. The company will continue to produce its regular line of NEMA frame sizes 66 through 505, ½ to 150 hp, to take care of the needs of customers who require or prefer the larger frames.

More information? Circle Item 54 on postcard, page 138.

Heater Parts Are Guaranteed

A 10-year bonded guarantee on Counterflo forced-air, space heater parts which are in direct contact with flame or flue gases is announced by Dravo Corp., Pittsburgh, Pa.

The guarantee covers the entire 10-year service of the parts with no pro-rated deductions for time used. It is backed by the company's reputation in the industrial heating field and by a bonding company.

The specific parts guaranteed are the floating stainless steel combustion chamber, and the double-bank tube section with the rear collection box and exhaust breeching.

More information? Circle Item 55 on postcard, page 138.

Absolute Pressure Indicator

An absolute pressure indicator with a range from 0.1 to 20.0 mm Hg and an expanded scale in the 0.5 to 5.0 mm range is announced by Hastings Instrument Co., Hampton, Va.

A direct reading instrument, it operates on 115 volts a-c and incorporates the same patented, heated thermopile principle employed in the company's vacuum and pressure measuring instruments.

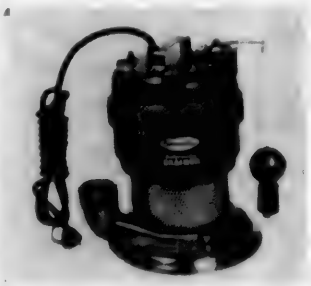
Noble-metal thermocouples are housed in nickel-plated gage tubes, in the indicator, to prevent outgassing, system contamination, and corrosion. The gage tube is not damaged by release to atmospheric or positive pressures. Its dimensions are 1½ in. in length by ⅜-in. outside diameter, with a ⅛-in. IPS male thread coupling. The internal volume of the tube is less than 0.05 cu in.

The instrument can be used with a one-knob switching unit, allowing a single operator to monitor multiple points in a system from one indicator. It can be calibrated for any length cable from the indicator to the gage tubes, and continuous readings can be taken without affecting pressure.

More information? Circle Item 56 on postcard, page 138.

Portable Sump Pump

An automatic submersible sump pump, known as the Rapidayton Nautilus, has been placed on the market by The Dayton Pump & Mfg. Co., Dayton, Ohio, to supplement the firm's line of brass and aluminum upright drainers.



One of the chief advantages of the pump is its size. It is portable so that it can be dropped into water or installed in the sump, out of sight and out of the way. It is 11 in. high, 9-5/16 in. at its greatest width, and weighs 35 lb. The pump is designed to prevent water damage in the basements of homes, commercial establishments, or industrial installations. Since it is portable, it can be used by contractors to get rid of standing water.

All the pumping parts are made of bronze, and the strainer screen and base of the drainer are made of brass. The drainer can be serviced in the field with standard parts, if necessary. The 1/3-hp motor is hermetically sealed in a steel case for underwater operation; it has a heavy-duty switch that is controlled by a plastic float.

More information? Circle Item 57 on postcard, page 138.

Additions to Pipe Line

Two additions to its line of flexible polyethylene pipe are announced by Chesflex Corp., Yonkers, N. Y.

One of the additions is Ches-Twin dual pipe, which consists of two sizes of the company's standard pipe joined together. This dual pipe is for use in jet well installations.

The other addition is pressure pipe for water systems with constant or variable pressure. The pipe is rated at 75 or 100 lb and is designed to withstand intermittent, short-duration surges of 3 to 4 times the continuous working pressure specified.

More information? Circle Item 58 on postcard, page 138.

Remote Damper Control

A sector gear and pinion device, with a wire type flexible control, has been developed by Arens Controls, Inc., Evanston, Ill., for the remote operation of dampers on room type air-conditioning units, and similar applications.

The unit will produce 1½ in. of linear push-pull motion by turning the knob 270 deg. The external portion of the control occupies 1¾ x 1¼ in. of panel area with 2½ in. of clearance behind the panel. It requires one nut for mounting, and is made of plated-steel.

More information? Circle Item 59 on postcard, page 138.

(*Concluded on page* 136)

The most convincing stamp of user satisfaction

ANOTHER REPEAT ORDER FOR SARCO

now another Ford Plant

equipped with Sarco heating specialties

Ford Foundry, Cleveland. *Architects and Engineers:* F. A. Fairbrother and George H. Miehls. *Consultants.* Albert Kahn Associated Architects and Engineers, Inc., Detroit. *Heating Contractors:* Smith and Oby Co., Cleveland.

8 Ford Plants now rely on Sarco dependability

To get repeat business it takes more than just promises of product performance . . . *it takes proof.*

For the past fifteen years Sarco product performance has been proved seven times over to the Ford Motor Company. Now the new Cleveland Foundry is the eighth Ford plant to be equipped with Sarco Heating Specialties. Over 7,000 steam traps, strainers, radiator valves and traps and other Sarco Specialties give dependable, efficient service in all eight plants.

Doesn't this repeat business speak for itself?

Specify Sarco Heating Specialties on your next job and be assured of complete customer satisfaction. Full details of all Sarco products are available on request.

Other SARCO-EQUIPPED plants of the Ford Motor Company

DEARBORN, MICHIGAN, *Ford Styling Building*
CLEVELAND, OHIO, *Engine Plant*
WAYNE, MICH., *Lincoln-Mercury Assembly Plant*
BUFFALO, N. Y., *Ford Stamping Plant*
DALLAS, TEXAS, *Ford Assembly Plant*
KANSAS CITY, MISSOURI, *Ford Aircraft Plant*
METUCHEN, NEW JERSEY, *Lincoln-Mercury Assembly Plant.*

Here's why so many architects, engineers and heating contractors specify and install Sarco

— job after job.

- **Proven dependability**
- **Trouble-free service**
- **Complete line from one reliable manufacturer**
- **Nationally known and preferred**

2020-B

SARCO SAVES STEAM

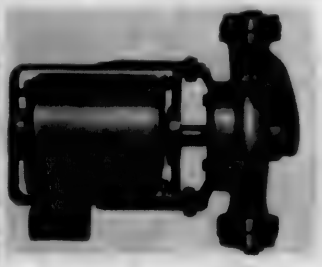
SARCO COMPANY, INC., Empire State Building, New York 1, N. Y.

STEAM TRAPS • TEMPERATURE CONTROLLERS • HEATING SPECIALTIES

(*Concluded from page 134*)

Variable Circulator

A hot water circulator, with variable operating positions, is available from The Triplex Heating Specialty Co., Inc., Peru, Ind. One circulator can be operated in either a horizontal (illustrated) or vertical shaft position. The only change necessary for the different positions is the arrangement of the oil cups so that the motor bearing can be properly lubricated.



The principal component of the circular is the electric motor, which rests upon a combination of rubber grommets and steel springs to eliminate vibration. The circulator's impeller is attached to an extension of the motor shaft in order that only the motor bearings need lubrication. All the rotating parts in the circulator are balanced as an assembly.

The circulator is available in sizes from 1 to 2 in., which have a shipping weight of less than 36 lb.

More information? Circle Item 60 on postcard, page 138.

Pipe Thread Sealing Compound

A thread sealing compound of Teflon, called Gilbreth 18, is announced by The Gilbreth Co., Philadelphia, Pa.

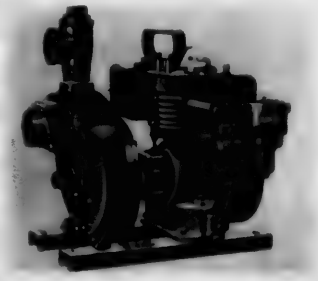
The material is recommended for pipes carrying volatile acids, alkalies, and solvents. It is chemically inert, biologically inert, and can be used continuously from —150 to 500 deg F.

As described in bulletin T-2, the material seals threads without cementing them so that equipment can be readily dismantled after intensive use.

More information? Circle Item 61 on postcard, page 138.

Contractors' Pump

A lightweight, low-head, single stage, 1½-in. centrifugal pump, is announced by Flint & Walling Mfg. Co., Inc., Kendallville, Ind. At 25 ft total head and 3600 rpm, the pump will deliver 100 gpm.



It is designed for heavy-duty intermittent or continuous pumping service and is recommended for rapid transfer of large quantities of water. It will handle water containing reasonable amounts of solids and abrasives.

The pump is self-priming with an automatic suction valve and has an open-type impeller, a replaceable wear plate, alignment rails, and balanced pressures to give maximum capacity and efficiency. Made with an aluminum body, the pump and its gasoline engine weigh 47 lb. The engine is air-cooled, 4-cycle, single cylinder with a 2-hp rating.

More information? Circle Item 62 on postcard, page 138.

Specific Gravity Indicator

The Spec/Gee is a device made by Brooks Rotameter Co., Lansdale, Pa., for the determination of liquid densities for continuous sampling and other processing service. A hydrometer, in a special enclosure, is placed so that fluid specific gravity can be read at all times.

The unit features safety shielding and side plates for the protection of plant personnel. Dowel pins are utilized in its construction for ease of assembly and disassembly.

The indicator is moderately priced, compact, and suitable for panel mounting. It is manufactured in all metals and alloys, and is available with a built-in thermometer and valve as additional equipment. The details of the indicator's design and construction and its principles of operation are given in Bulletin No. 800, available on request.

More information? Circle Item 63 on postcard, page 138.

Abrasive Cutting Machine

An abrasive cutting machine is being marketed by Beaver Pipe Tools, Inc., Warren, Ohio. Called the Speed-Cut, the machine is made for metalworking plants or contractors for cutting various shapes and types of materials.

Thin-walled steel aircraft tubing, solid pipe, galvanized steel, angles, structural members, or solid bars can be cut by the machine. For example, in field demonstrations, a 2-in. steel pipe was cut in 5 seconds; a 4-in. cast iron soil pipe was severed in 6 seconds; a cold-rolled 2-in. piece of steel was parted in 20 seconds; and a 4 x 4 x ⅜-in. steel angle took 12 seconds to cut.

Classified as No. 14 and No. 20, the cutting machine has the following capacities: A No. 20 with a 20-in. cutting wheel and a wheel speed of 2300 rpm can sever a 6-in. pipe or a 2½-in. solid rod or bar. A No. 14 with a 14-in. wheel and a wheel speed of 3000 rpm can cut 4-in. pipe or a piece of 2-in. solid rod or bar. The No. 14 uses a 14-in. wheel; the No. 20 uses an 18 or 20-in. wheel.

On the No. 20 machine, the foot-controlled chain vise holds the material; the No. 14 has a hand-operated chain vise. A welded steel wheel guard shields the wheel and is attached to the one-piece tilting table. The guard rests on a heavy-gage metal shield to provide protection during cutting operations. The rear, lower portion is enclosed by a spark arrestor.

Both the No. 14 and No. 20 machines have sealed, double-row ball bearings, and the No. 14 has replaceable, oil-less sleeve bearings.

More information? Circle Item 64 on postcard, page 138.

PRODUCT INFORMATION SERVICE

Use the postage-free postcard below for further information on:

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- **New Catalogs**

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NEW CATALOGS

AIR CONDITIONING STUDY—The advantages of installing year-round air conditioning in churches are graphically presented in a case-history study by Carrier Corp., Syracuse, N. Y. The brochure points out that churches of all denominations have experienced one or all of four notable improvements after air conditioning was installed. A brief list of air conditioned churches of varied architecture, construction and size throughout the country is included in the 6-page foldover. Their conditioning systems range from packaged units to large central systems involving greater-capacity refrigerating and air handling components. .....Item 101

DUCT FURNACE BULLETIN—A 4-page bulletin, No. 354, that outlines uses of the Modine gas-fired duct furnace in heating, ventilating, and air conditioning systems is issued by Modine Mfg. Co., Racine, Wis. Published in two colors, the bulletin includes data on the use of stainless steel in the construction of the heat exchanger and burner. Drawings show how the duct furnace can be installed in a duct to operate with a remote blower; with a blower connected to the furnace to act as a central heat source; and how it can be used in heating and cooling applications. Dimensional and performance data are covered in charts and drawings. .....Item 102

UNIT COOLER SPECIFICATIONS—Two catalog sheets which give the specifications and dimensions of Flexoid industrial unit coolers are available from Drayer-Hanson, Inc., Los Angeles, Calif. Sheet C-5.42 gives the performance data of seven different capacity units, from 457 to 3600 Btu per hr, that use Freon refrigerant. Sheet C-5.43 gives the performance data of four units, from 1200 to 3600 Btu per hr, that use ammonia refrigerant. .....Item 103

WATER TREATING LITERATURE—Maintenance hints concerning water pipe corrosion are given in the form of eighteen questions and answers contained in a bulletin published by Water Service Laboratories Inc., New York, N. Y. The bulletin, intended for future reference, is one of a series issued from time to time. Previous issues are furnished by the company on request. Additional literature about corrosion in water piping, boilers, and air conditioning systems is also available from the company. .....Item 104

MOTOR BUYING INFORMATION—A 32-page catalog of buying information on a-c motors is available from General Electric Co., Schenectady, N. Y. Designated GEC-1224, the bulletin presents buying information on standard a-c fractional and integral horsepower motors in most general use. Included are general and definite purpose, fractional horsepower motors and gear motors. A special section on the selection of integral horsepower motors covers horsepower requirements, enclosures, starting current limitations, speeds, motor types, and selection of fuses and circuit breakers. Descriptions and specifications include single-phase, poly-phase, totally-enclosed fan-cooled, and gear-type integral horsepower motors. The information on the motors includes photos, ratings, book prices, dimensions, weights, frame numbers, and standard modifications. .....Item 105

BROCHURE ON HOT GAS FANS—A 1-color brochure describing bifurcated fans for high temperature gases is available from the fans' manufacturer, Kody Blower Co., Trenton, N. J. The brochure contains tabulated performance data of seven different size fans based on handling air at 70 deg F and at a barometric pressure of 29.92 inches of mercury. A table listing the dimensions of the fans and line drawings showing 3 typical installations are also given in the brochure. .....Item 106

CONTROL SYSTEMS PRESENTED — A 14-page photographic presentation of how the company's automatic combustion control systems are being used with various types of gas-fired boilers is presented by Bulletin MSA-116, available from Hagan Corp., Pittsburgh, Pa. The 14-page bulletin shows by a series of pictorial diagrams the applications of control equipment as the boilers increase in size from the simplest natural draft boiler using a parallel control system, to the very large boilers, needing 3-element feed water control equipment and interlocking safety devices. The purpose of the bulletin is to present basic information about good combustion control practices for gas-fired steam generators. .....Item 107

MULTI-ZONE UNIT BULLETIN—An 8-page informative bulletin on multi-zone air conditioning units is available from the manufacturer, Marlo Coil Co., St. Louis, Mo. The information consists of descriptions of the units' applications, sizes, and functions. Also contained in the bulletin is detailed information on the design and performance characteristics of the units, nominal rating tables, and a brief description of floor and ceiling remote room air conditioning units. .....Item 108

REVISED STEAM TRAP BULLETIN — Bulletin No. 258, revised by Sarco Co., Inc., New York, N. Y., describes the company's new thermodynamic steam trap and explains why practically no maintenance is required. A 30-day trial offer is printed on a tipped-in card. The 4-page bulletin also lists 13 features of the trap. .....Item 109

HANDBOOK MANUAL IS REVISED—Illustrated Automatic Controls Manual for Heating and Air Conditioning has been revised by Barber-Colman Co., Rockford, Ill. The sections of the manual that have been revised are Air Conditioning Control Systems, Hot Water-Panel Heating, Unit Ventilator Control, and Control Equipment. A check list, F-6437, is included with the revisions to enable a user to determine whether his manual is complete and up-to-date. .....Item 110

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WATER CLOSET CATALOG—A 16-page catalog, No. 55, of automatic pressure tanks, frost-proof yard hydrants, and frost-proof water closets is issued for plumbers and jobbers by Philip Haas Co., Dayton, Ohio. The company's products are shown with full illustrations and roughing measurements. List prices are shown in the catalog, and a plumbers' net price sheet is bound into the catalog for ready reference in ordering. .....Item 131

BROCHURE DESCRIBES BOILER—A 4-page brochure which describes the construction of a low waterline boiler, the LWL series, is available from Fortner Boiler Co., Brooklyn, N. Y. The boiler's capacities are given for steam, ranging from 2650 to 42,500 sq ft and for water from 3540 to 56,660 sq ft The literature illustrates a cut-away of the boiler, showing the placement of the staggered boiler tubes, the position of the tankless coil for domestic hot water, the firebox construction, the insulated flue door, and other features. The dimensions of the boiler are also given in the literature for the 16 sizes; they explain how the boiler can overcome headroom problems. .....Item 132

LIQUID CHILLER IS DESCRIBED—A liquid chiller, called Flow-Therm,for air conditioning, heat pump, and industrial liquid cooling applications is the subject of catalog No. 220-A announced by Acme Industries, Inc., Jackson, Mich. The make up of the liquid chiller package is explained in detail and selection procedures are given for choosing the chiller, the condenser, and the refrigerant controls. .....Item 133

COOLING TOWERS DESCRIBED—A bulletin, designated No. 20-104-55, describes the 1955 line of cooling towers manufactured by Havens Structural Steel Co., Kansas City, Mo. A reproduction of the guarantee that the company gives with the towers is printed on the front cover. Under the heading of specifications, the materials are listed from which the towers and their components are made. Nine features of the towers are listed in another section. Technical and dimensional data of 15 different size towers is also given in the bulletin. .....Item 134

CONDENSATION PUMP BULLETIN—An 8-page, 2-color booklet on condensation pumps has been published by C. A. Dunham Co., Chicago, Ill., manufacturer of heating and cooling equipment. The bulletin, No. 1403, contains photos, drawings, and other technical data on capacities and dimensions pertaining to the construction, application, and installation of the company's condensation pumps. .....Item 135

COOLING TOWER PUMP MANUAL—A manual for sizing cooling tower pumps and piping is introduced by Bell & Gossett Co., Morton Grove, Ill., manufacturers of hot and chilled water circulating equipment, centrifugal pumps, and refrigeration equipment. The 8-page manual is patterned after the procedure used in the company's B&G Handbook. By means of six steps, an efficient and economical selection of cooling tower pumps and piping can be made. Also released by the company are a revised selection chart and a list price sheet, CSP-185, on series 1532 and 1531 centrifugal pumps.....Item 136

WATER HEATER SELECTION GUIDE—A guide in selecting the correct commercial water heater for a variety of establishments to conform with AGA standards is provided by an 8-page catalog issued by Ruud Mfg. Co., Kalamazoo, Mich. The catalog, Form RS 100A, explains how AGA use approval works so that specific automatic gas water heaters can be matched to specific hot water needs. A chart in the literature prescribes the correct model for the type of establishment served, the condition of the water, whether hard or soft, corrosive or non-corrosive, the temperature range requirements, and the recovery rate needed. .....Item 137

MOTOR CONTROLS ARE CATALOGED—A catalog of motor controls for air conditioning, heating, ventilating, pumping, and compressing equipment is issued by Cutler-Hammer, Inc., Milwaukee, Wis. The controls and switches are indexed in the catalog, both numerically and according to their application, such as pumps, fans, and motor starters. The application, operations and features of each item are described in the catalog, in addition to their dimensions, weights and selection tables. A price list of the controls is also published by the company.....Item 138

TOWER AND CONDENSER CATALOG—An 8-page catalog describing water-savers with copper water surfaces is issued by Bush Mfg. Co., West Hartford, Conn. The units covered, by the catalog, are the BEC evaporative condensers and CDT cooling towers, which feature 4-way interchangeability. It also explains how the substitution of copper Inner-Fin coil for copper decking converts the same basic unit from a cooling tower to an evaporative condenser, and how either unit can be arranged with a blower fan or propeller fan. The bulletin contains complete specifications and ratings. .....Item 139

PUMP LITERATURE IS RELEASED—A 24-page Motorpump bulletin, Form 7003-E, has been released by Ingersoll-Rand, Phillipsburg, N. J. The literature covers the company's entire line of close-coupled pumps from ½ to 75 hp sizes for delivery of 5 to 2000 gpm. The bulletin is designed to make it easy to select the correct size and model. A visual and concise index shows the basic classifications of the pumps covered with their specifications. The next three pages highlight the advantages of the pumps and point up their design features. On the following pages each class of pump is explained and illustrated in detail. Also illustrated are self-priming units and jet pumps. Modifications that can be made to standard units are shown. Four pages are given over to tables of dimensions, weights, performances and mountings. Two pages offer a typical pumping problem with its solution, plus pipe friction tables. .....Item 140

TABLOID FEATURES BOILERS—A news tabloid, AD-144, presenting its self-contained boilers is announced by Cleaver-Brooks Co., Milwaukee, Wis. The publication informally reviews the boilers with articles and comments from company officials. Illustrations show installations, demonstrations, a cut-away view of the boiler, and plant facilities. Also included are articles of interest to architects, engineers, and buyers. .....Item 141

CAP AND PLUG LITERATURE—A 4-page catalog, No. 45-1, listing the available sizes and specifications of Shurcaps caps and plugs is offered by Ray A. Scherer and Co., Detroit, Mich. It contains descriptions of the caps and plugs' uses, and dimensional information covering 5 types of rubber and 3 types of plastic caps and plugs. .....Item 142

D-C MOTOR BULLETIN AVAILABLE—A 12-page illustrated bulletin, No. C-2082 describes the Super T d-c motors made by Reliance Electric & Engineering Co., Cleveland, Ohio. The booklet explains the standard performance of the motors, and gives their speed ranges, acceleration rates, enclosures, dimensions, and selection data. Photographs, diagrams, charts, and sketches help to illustrate the explanation. .....Item 143

COOLING TOWER CATALOG OFFERED—A catalog on cooling towers used with air compressors is offered by Halstead & Mitchell, Pittsburgh, Pa. The 16-page catalog, WT & CT-553, presents operating characteristics, specifications, and selection and installation data of 29 standard commercial cooling towers, ranging in capacity from 5 to 85 tons. Several pages are devoted to tables, drawings and graphs. The information covered includes a comprehensive table of cooling tower nominal ratings for both 78 deg and 75 deg wet bulb temperatures, outlet water temperature plotted against wet bulb temperature, tower capacity plotted against wet bulb temperature, and layouts for year-round operation and inside use. .....Item 144

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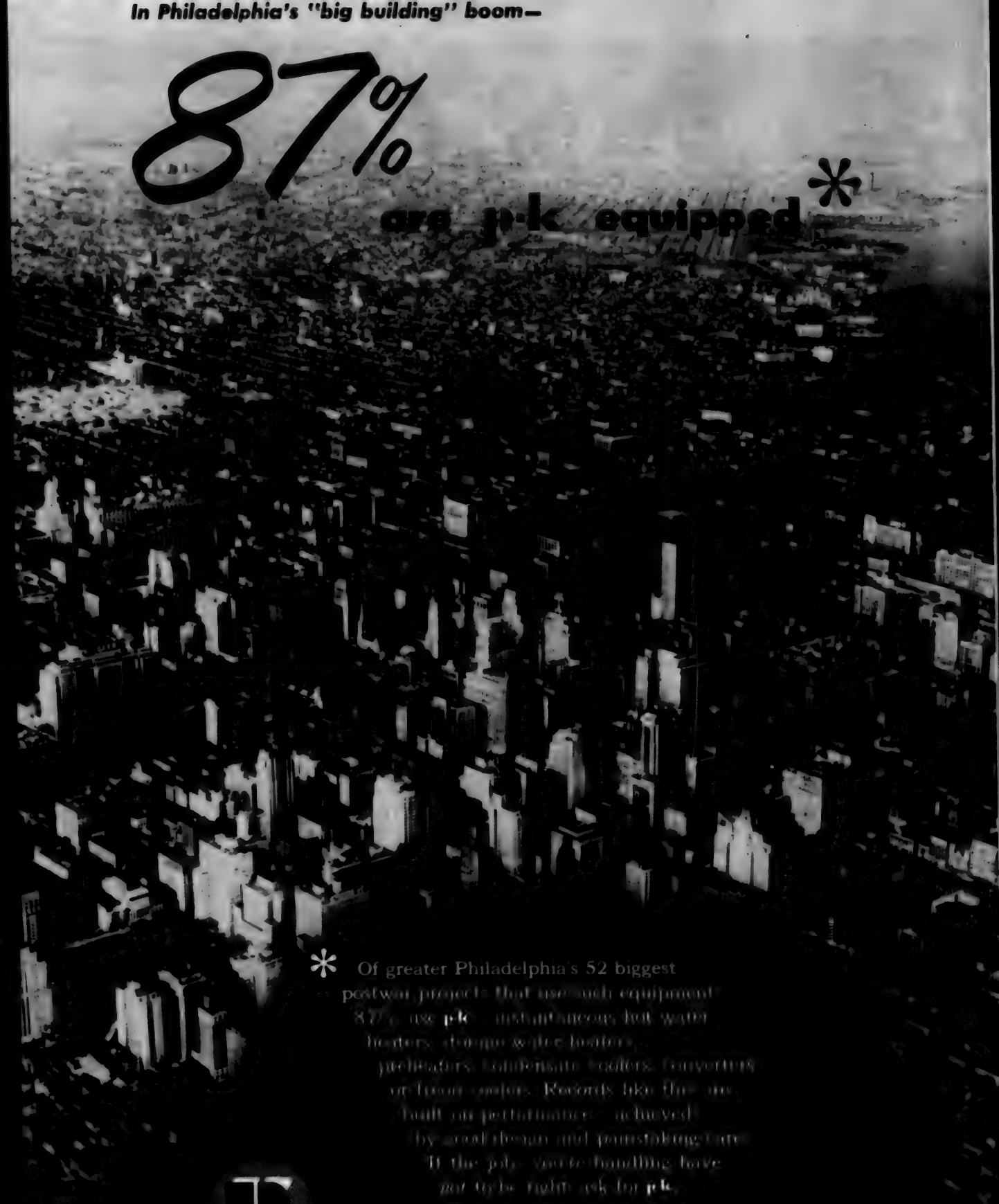

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PIPING

Fire Protection for Apartment Houses

MODERN apartment houses, by reason of advanced trends in their design and function, have become exceedingly popular with the result that they are now found in small towns, in the suburbs, as well as in large cities. Moreover, because of their neat appearance, planted zones, play areas and parking facilities, they have become valuable assets to the local community. Since the modern apartment house is considered home by a community of perhaps over 100 families living under the same roof, careful consideration must be given to achieve adequate fire protection.

In most instances, the apartment house because of its construction is classified as a fireproof building. However, even fireproof buildings burn as the records of fire reports show, and therefore some physical means of fire protection must be considered for the building. The system that affords this protection is called a fire standpipe system and is comprised of an arrangement of piping

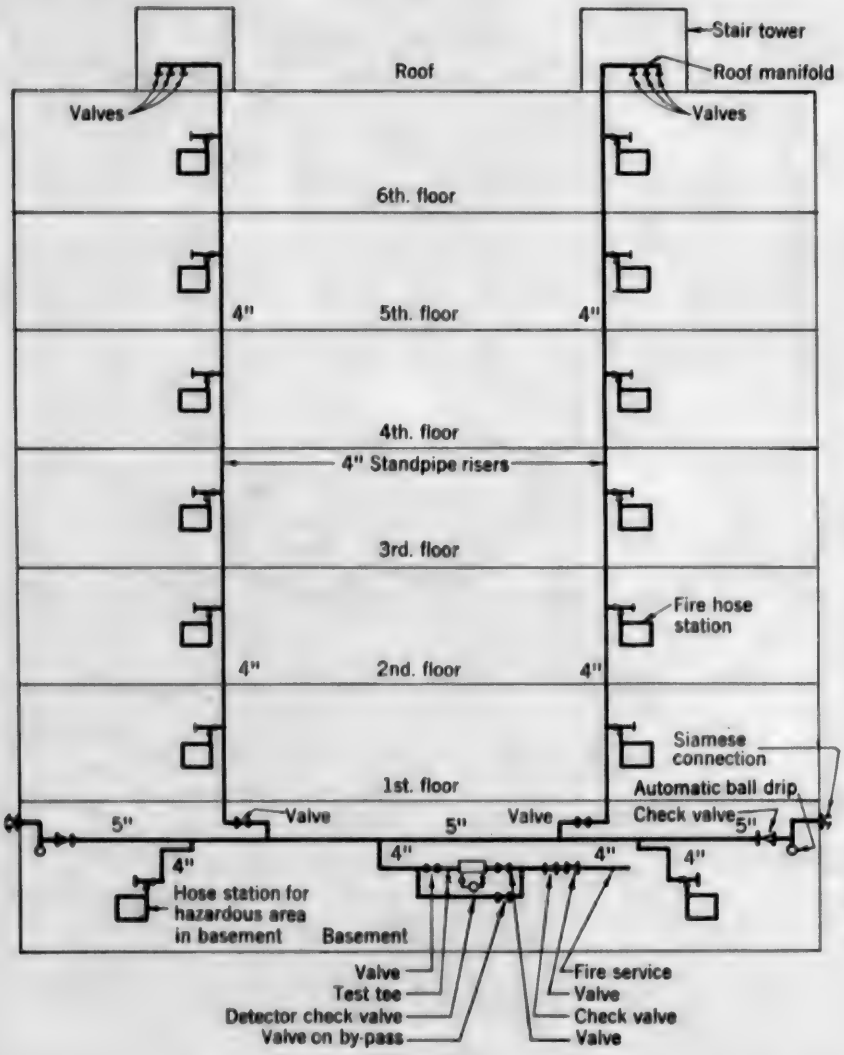

Fig. 1. A typical riser diagram for a 6-story apartment house. These risers serve the fire hose stations on each floor and the roof manifold.

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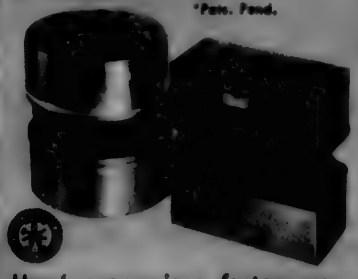

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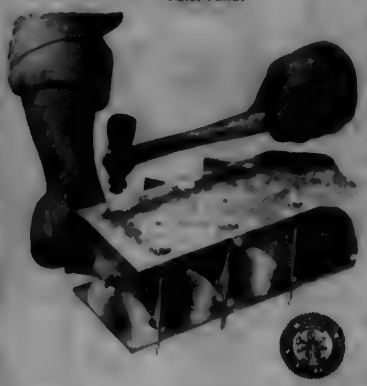

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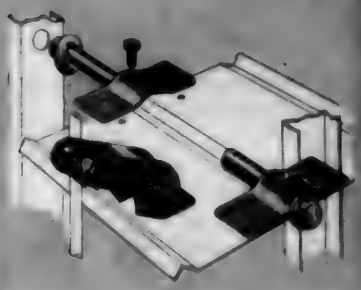

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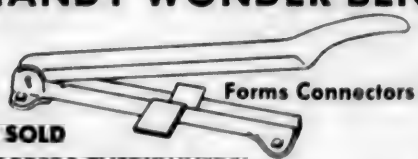

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and hose racks, installed in the escape stairways of the building and in other hazardous areas for the purpose of controlling and extinguishing the outbreak of a fire at its source.

The function then, of the fire hose station located at each floor level is to provide the tenants with a means of first aid protection in the event of a fire. More important, however, it furnishes connections of adequate size to which the fire department may attach its hose and fight the fire at any floor level.

Figure 1 is a riser diagram of a typical fire standpipe system for a building we shall assume to be a 6-story apartment house. The various parts of the fire standpipe system are illustrated and labeled. In this article we shall discuss the component parts that are described and the necessary consideration that should be given each part during the design stages of the proposed system.

Omitted are the various requirements of the fire underwriters or local authorities that determine the type or scope of system to be used. Therefore, it must be assumed, that the water pressure is adequate and that the system shown, including the pipe sizes and the arrangement of piping, meet all the necessary requirements of the governing departments.

Basement Piping

The first part of the fire standpipe system to be discussed is the basement piping. This part of the system may best be explained with the help of Fig. 2, which shows a typical arrangement of such piping.

As shown in Fig. 2, all the piping and equipment, either necessary or required by code has been indicated. For a better understanding of this part of the system, the purpose of each item will be covered.

Water supply. The 4-inch diameter water supply shown is considered the primary source of water because it is capable of furnishing at least 20 psi flowing pressure at the highest hose outlet, excluding the roof outlet. The exact pressure requirements for each locality should be ascertained from the local authorities.

The supply starts with a connection to a street water main or a separate street fire main. A valve and curb box or other means of control is installed on this line at some point usually designated by the local water company. The principal purpose of this valve is to shut off the water supply to the building in the event of a fire serious enough to endanger the interior piping. This practice prevents the loss of water or water pressure, should part of the standpipe system be broken or fractured by the heat of the fire.

On the inside of the building, the water supply is equipped with an O.S. & Y (outside stem and yolk) valve and a check valve. The O.S. & Y valve is the interior control for the entire system. The check valve is installed to block the entry of water from the secondary source of water supply. During a fire, the fire department, by means of its pumping equipment and through the siamese connections, maintains a high water pressure in the standpipe system. Since this pressure is greater than the available pressure in the primary source of supply, a check valve is needed to prevent the loss of pressure or the short circuiting of the pumped water through the primary source of water supply.

Water meter. Included on the interior water supply piping is a water meter with its recommended hook-up as shown in Fig. 2. The meter indicated is of the detector check valve type and although it is not required in all localities, it has been shown to cover the requirements of many water companies. The purpose of this unit is to meter the passage of water without restricting the flow and to guard against the leakage or misuse of water intended for fire protection purposes. Such meters are tested frequently.

Siamese connections. These are fire department connections and are considered the secondary source of water supply. In the event of fire, the fire department can, by means of its pumping equipment, pipe water from the nearest fire hydrants to the siamese connection to serve and maintain an adequate water pressure within the standpipe system. Two siamese connections are shown in Fig. 2, and have been so located, that each connection faces a different street, thus assuring accessibility to the fire department. Siamese connections are joined together by means of a 5-inch cross connection line, which assures an ample flow of water to one or both standpipe risers when needed. When specifying the proposed siamese connection, it is important to mention that the hose threads be of the same type used by the local fire department serving the particular area in which the building will be located.

An automatic ball drip and a check valve are installed in the location shown in Fig. 2. The automatic ball drip, drains the water out of the line between the siamese con-

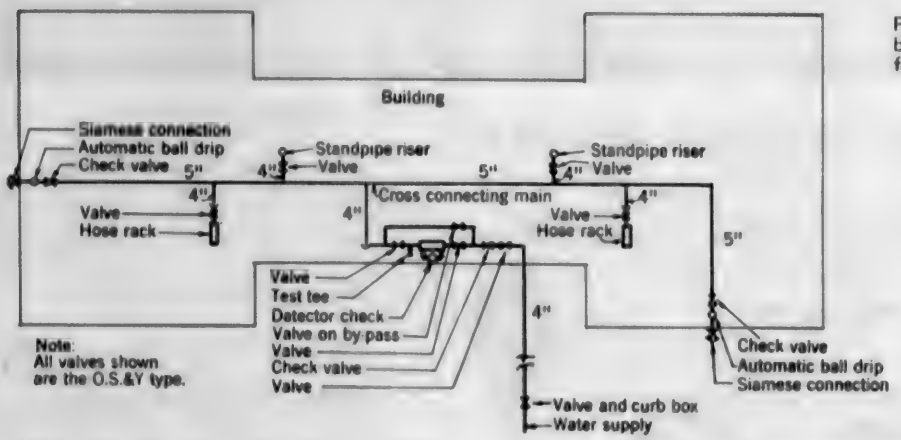
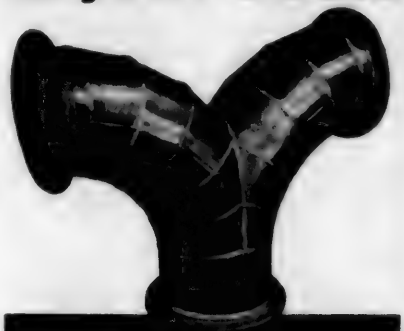


Fig. 2. Arrangement of piping in the basement that is part of the building's fire standpipe system. Plan shows the location of the various valves.

Cut Piping Layout Costs



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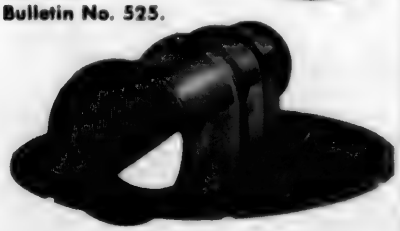

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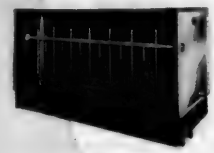

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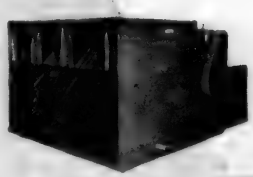

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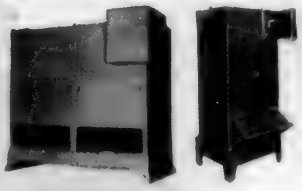
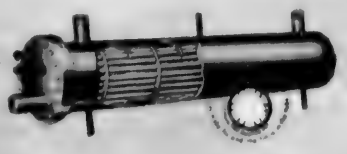
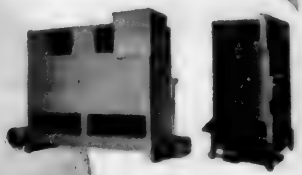


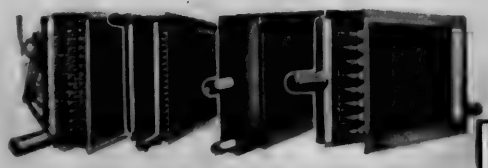
COOLING TOWERS Outdoor-Indoor. 3 to 75 tons. Catalogs No. CT-1 and KT-3.



LIQUID CHILLERS—direct expansion type. — Sizes 2 to 300 tons. Catalog No. LC-1.



EVAPORATIVE CONDENSERS—Indoor-Outdoor. 3 to 75 Tons. Catalogs No. EC-1 and EK-3.



FINNED COILS—Direct Expansion Coils, Water Coils, Steam Distributing Tube Coils. Standard Steam Coils. Sizes up to 36" wide x 120" long. Catalog No. DC-1.

Write for name of nearest representative and catalogs needed.

KENNARD CORP.
1823 S. HANLEY ROAD
ST. LOUIS 17, MO.

nection and the check valve, after the connection has been used or tested. This automatic drainage is necessary to prevent freezing in cold weather climates. The check valve prevents water from the primary source from entering the drained line.

Fire standpipe risers. The two 4-inch standpipe risers shown, are supplied from the 5-inch cross-connecting main. The O.S. & Y valves, installed in accessible locations are for use by the fire department. The valve is closed if, during a fire the riser can no longer be used or is in danger of fracturing from the heat of the fire. The base of the riser is usually supported by means of a base elbow resting on a pipe stand or on a brick or concrete pier; or else by means of a clevis type hanger, the piping is supported from the first floor slab. Both methods are satisfactory.

Hose Stations

The important part of the fire standpipe system is the hose station. It contains equipment that is actually used to extinguish a fire and a detail of a typical hose station is illustrated in Fig. 3.

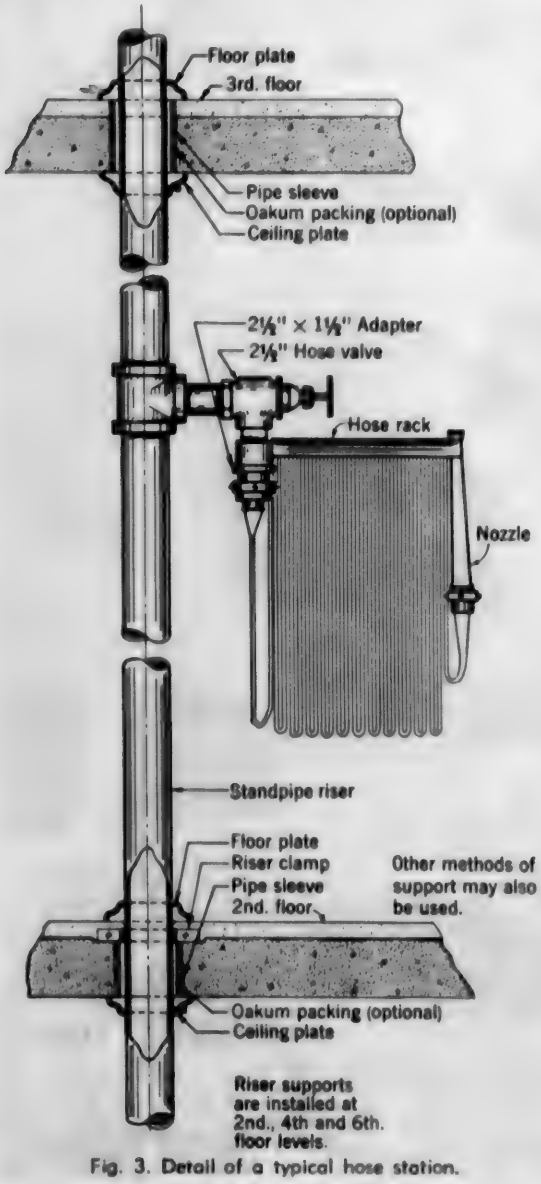


Fig. 3. Detail of a typical hose station.

Although the hose rack may be enclosed in a cabinet, and several different arrangements of hose racks and equipment are available for use, the arrangement shown has been used for example in this particular case. As shown in Fig. 3, the hose station consists of a number of various items, all necessary for the satisfactory operation of the unit in the event of a fire. The purpose of each of these items is best explained in the following paragraphs. Design data are included.

Hose. The hose contained on the rack is 1½-inch unlined linen hose used because it is easier for the tenants to handle than 2½-inch hose, and is therefore classified as first aid fire protection. By means of the 2½-inch x 1½-inch adapter shown, the 1½-inch hose may be quickly removed by the fire department to permit the use of its 2½-inch hose. The length of the hose required is determined by the most distant point in the apartments to be reached by the hose. Hose of 50 ft to 75 ft lengths are generally used, depending on the particular application requirements.

Pressure reducing device. A pressure reducing device is used when the water pressure at the hose station exceeds the prescribed pressure recommended by the fire underwriters or local authorities. Often this pressure is set at 50 psi. There are several approved types of reducing devices available, but the one intended for use in this case is the pressure reducing disc, that may be adjusted for the desired pressure. This disc is inserted into the hose coupling and may be quickly removed during a fire.

Hose valve. The 2½-inch hose valve shown is set at a distance of approximately 5 ft to 5½ ft above the floor as this has been found to be the most desirable height. Here again it is important to mention that the hose threads should be of the same type used by the fire department.

Riser Support

A typical riser support has been included in Fig. 3, to show the manner in which the piping is supported. Although, there are several methods that may be used for the support of the risers, the method shown is for the purpose of illustration only.

Roof Manifold

A roof manifold which consists of an O.S. & Y valve and two or more 2½-inch hose connections is installed in each of the two stair towers at the roof level to enable firemen to fight a fire on the roof. It also makes it possible to protect the apartment house in the event of a fire in an adjoining building, by cooling down the roof and exposed side of apartment house.

The unit is shown on Fig. 1, and is installed in a heated space. If a heated space is not available, then the valve must be installed below the roof, in a heated space, with the valve handle so located, to be easily opened by the fireman on the roof. This practice prevents freezing in cold weather. A 50 to 75 ft length of 2½-inch rubber lined hose is placed on a rack near the manifold for use by the fire department.

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- EASY TO INSTALL *Anyone Can Do It!*
- COMPLETE—NO WOOD MOLDINGS TO ADD!

NEW! THIN CORE GRILLE FOR DOORS — PARTITIONS 1/4" to 3/4" THICK!

First Grille ever designed specifically for thin doors and partitions. Anyone can install it in just a few minutes time. No close tolerances required . . . almost a half-inch extra on sides for positioning. Telescoping auxiliary frame fastens to grille with posts and screws. Clamps tight. No holes to position. Practically no danger of ruining door. No wood moldings. All steel. Rattle-proof. No vision, with 80% free area. Available with or without frame, all sizes. Gray or tan prime coated, or Hammertone finish in grey or bronze.

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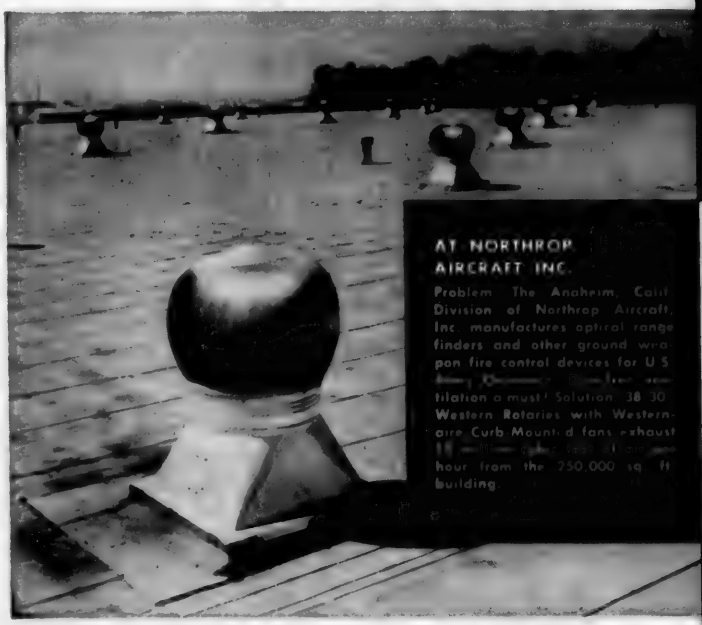
Where the problem is ventilation — the solution is a WESTERN SYSTEM



AT NORTHROP AIRCRAFT INC.

Problem: The Anaheim, Calif. Division of Northrop Aircraft, Inc. manufactures optical range finders and other ground weapon fire control devices for U.S. [illegible] ventilation a must! Solution: 38 30" Western Rotaries with Western-aire Curb-Mounted fans exhaust [illegible] hour from the 250,000 sq. ft. building.

AT YOUR PLANT

Western Rotary ventilators, with or without fans, can do the most for you. A 2 mph wind operates the Western Rotary—and it continues to exhaust during wind lulls due to superior balance design. Years of trouble-free performance—bearings carry lifetime guarantee. Check Sweet's or AEC for high exhaust capacity figures. Then specify Western—a first-rate line of rotary, stationary, continuous ridge, directional ventilators and exhaust fans. Handled by wholesalers coast to coast.

Western Engineering & Mfg. Co.
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Dealers—order from your local jobber.
Write for catalog, or tell us your special installation problems.

NEWS OF THE MONTH

GAS AND OIL RESERVES

show increase in 1954 over 1953. New discoveries keep ahead of record production.

Proved recoverable natural gas reserves in the United States on December 31, 1954, reached a new high of 211.7 trillion cubic feet, an increase of 263 billion cubic feet over reserves a year earlier, it was announced in a joint report of the Committee on Reserves of the American Gas Association and the American Petroleum Institute. Extensions and revisions, and new discoveries of natural gas in 1954 thereby again exceeded production which also attained a new peak of 9.4 trillion cubic feet. Production of natural gas was about 2 billion cubic feet more in 1954 than in the previous year.

The A.G.A. Committee on Natural Gas Reserves estimated that proved recoverable reserves of natural gas liquids had decreased slightly at the year-end to total 5.2 billion barrels on December 31, 1954, as compared with record reserves of 5.4 billion barrels on the comparable date in 1953. The production of natural gas liquids during 1954 totaled 301 million barrels as compared with 303 million barrels produced in 1953.

• **OIL.**—Crude oil reserves on December 31, 1954, totaled approximately 29.6 billion barrels, compared with 28.9 billion barrels at the end of 1953, also a new record. The total estimated liquid hydrocarbon reserves on December 31, 1954, were 34.80 billion barrels, compared with 34.38 billion barrels a year earlier.

• **GAS.**—New discoveries of natural gas reserves in 1954 totaled 5.0 trillion cubic feet compared with 7.1 trillion cubic feet of new reserves brought in during 1953. Extensions and revisions of previous estimates during 1954 added 4.6 trillion cubic feet to the proved recoverable reserves. Such expansions and revisions totaled 13.4 trillion cubic feet a year earlier. Nearly 90.9 billion cubic feet of natural gas were added to estimated reserves in underground storage during 1954.

AUTOMATIC STEAM GENERATOR

developed for commercial and small industrial use will burn bituminous coal smokelessly, provide continuous ash removal.

The development of an automatic steam generator, which combines the economy of coal with high efficiency and convenience in compact and automatic equipment, has been announced by Bituminous Coal Research, Inc., the national research association for bituminous coal. The equipment has been designed for commercial and small industrial applications.

It is anticipated that this automatic coal-fired unit will have a size range from 1,500 to 20,000 lb of steam per hr and pressures up to 300 psi. It will be applicable for space heating, process hot water, and high-pressure process steam installations.

• **OBJECTIVES.**—The objectives of the BCR research program include the development of (1) a compact, efficient boiler fired by a stoking device which will burn coal smokelessly and permit continuous mechanical ash removal; (2) a stoker-boiler unit which will operate automatically through a wide load swing, reduce or eliminate manual rekindling of the fire, and provide for automatic start from a banked or idle condition; (3) automatic ash-removal equipment, controls, and other auxiliaries which can be combined with the stoker-boiler unit to form a complete package and can be factory assembled and tested; (4) a control system reliable and simple enough to permit operating personnel to make any repairs or adjustments, and (5) a coal-fired package unit with an initial cost comparable to that of competitive equipment.

• **STOKER.**—Heart of the automatic coal-fired steam generator is the coal stoker. BCR and its Power and Industrial Uses Committee decided that the use of a water-cooled, vibrating-grate, crossfeed stoker would most likely meet requirements. With such a stoker, the front to rear flow pattern of the coal and ash permits collection of the ash at a single point at the rear of the furnace, thereby facilitating the design of automatic ash-removal equipment.

The operating principle of a vibrating grate, requiring only an eccentric sheaved to the driving motor, provides a drive mechanism simplification not possible with other types of coal burners. It is believed that the water-cooling feature of the grate will enable burning of coals having low ash-softening temperatures, and should result in minimum grate maintenance. In addition, the design of the grate makes it adaptable to many modern boiler designs.

• **TEST UNIT.**—The pilot model of the BCR automatic steam generator was installed for test at the BCR Laboratory, Columbus, Ohio, during September, 1954. The components include a low-pressure Kewanee fire-box boiler with a rating of 1490 lb of steam per hour, and a BCR adaptation of an American Engineering Company Vibra-Grate stoker with 8½ sq ft of grate surface. A twin-screw ash conveyor, designed by BCR and adaptable to a wide variety of fire-box boilers now on the market as well as several water-tube designs, is also included. A simple and compact control system is mounted on the control panel at the side of the boiler, and provides easy access for initial settings and adjustments during operation.

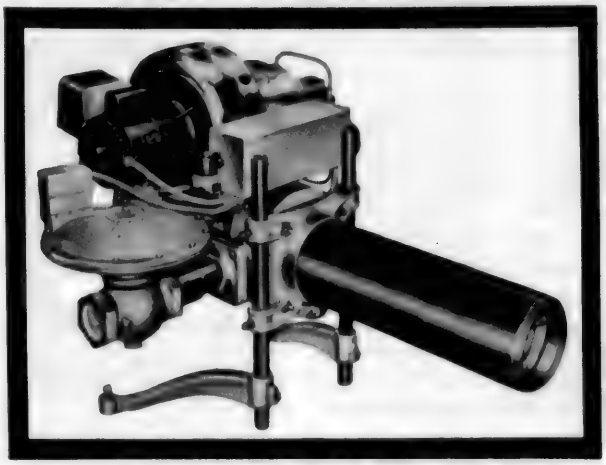
Early tests indicated the need for properly installed overfire-air jets to eliminate smoke and at the same time encourage flame travel over that portion of the grate on which coking of the coal was taking place. Design modifications were also required to enable re-establishing ignition in the coking area of the grate after starting from a bank.

• **SUCCESSFUL OPERATION.**—While not all the problems have been solved, satisfactory operations with extremes in coal-caking properties and ash-softening temperatures have been possible. In the tests conducted to date, completely automatic operation of the unit has been obtained.

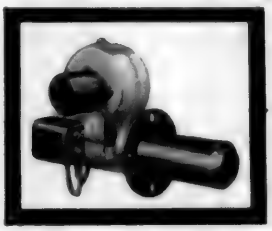
(*Continued on page* 148)

no pulsation!

the Syncro-Flame Dual-Fuel and Power Gas Burners will fire without PULSATION all types of boilers, warm air heating units and SCOTCH MARINE BOILERS



the burner head design of Syncro-Flame Dual-Fuel and power gas burners permit firing at rated inputs without pulsation. Syncro-Flame's Dual-Fuel burns either gas or oil at maximum efficiency—fuel/air changeover is automatic—operating by either outside thermostat or remote manual control. Syncro-Flame's Dual-Fuel unit is the most reliable of all. . . . Approved over the entire range of operation by Underwriters Labs. Write for spec. sheets and verified facts on savings your processing customers can make by using dual-fuel—burning gas in the off-peak season, or when the load is low.



syncro-flame power gas . . .

these burners operate at maximum efficiency . . . using the same high efficiency head with forced mixing of fuel and air . . . a short, swirling flame works where you need it . . . not on the furnace wall.

You're money ahead buying an approved and field proven unit. Syncro-Flame burners have been in constant use since 1951. 75,000 to 4,100,000 BTUs/hr. capacities.

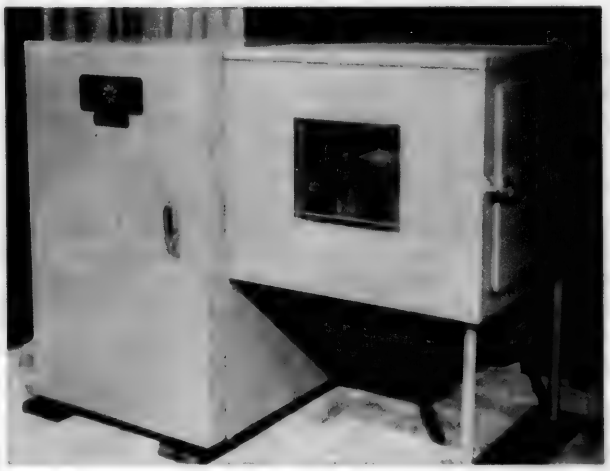
syncro GAS flame BURNER

syncro DUAL GAS-OIL flame BURNER

synchronous flame inc.

209 n. main st., walworth, wisconsin

NEW NIAGARA



AIR CONDITIONED TEST CABINET

USES—to determine effects of controlled temperature and humidity conditions on test subjects of all kinds—to test processes—to find optimum conditions.

RANGE—With water and electric power services only, the range is from freezing temperature up to 150°F (dry bulb). With refrigeration, and using Niagara No-Frost Liquid to prevent freezing of sprays, you achieve dew point temperatures as low as minus 30° F. Control of relative humidity from 5% to 95% is obtained at all temperatures in this range. Air capacity is 200, 400 or 600 c.f.m.

METHOD—Air is saturated in the air-conditioning unit at the required dew point temperature and reheated to the desired dry bulb temperature. This is the method of the Niagara Type A Air Conditioner which has been proven for the most exacting duty over twenty-five years.

CONTROL—The dew point thermostat is located in the air stream, the dry bulb thermostat in the test cabinet. No moisture sensitive instruments are needed. Recorders may be used to obtain a complete record of conditions.

TEST CABINET—(inside) dimensions are 30″ x 28″ x 24″ with access clear opening 26″ x 22″. Insulation is the equivalent of 4″ cork.

AIR CONDITIONING UNIT is enclosed in an insulated cabinet adjoining the test cabinet. A door the full size of the cabinet wall gives complete access.

Write for Complete Information. Address Dept. H.V.

NIAGARA BLOWER COMPANY

405 Lexington Ave. New York 17, N.Y.

District Engineers in Principal Cities of United States and Canada

AUTOMATIC STEAM GENERATOR

(*Continued from page* 146)

The combustion control, which is actuated by the steam pressure, effectively regulates the coal feed and forced draft over a wide load swing. The boiler has been operated at from 200 lb per hr to 2400 lb of steam per hour with remarkably quick response.

The coal is conveyed by a screw conveyor from the bin to the stoker hopper where, by means of a bin-level control, a constant supply is maintained for the stoker. An automatic ash conveyor removes the ash from the pit at the end of the grate to two conventional ash cans. A timing device, set according to the percentage of ash in the coal, maintains a controlled level of ash in the pit.

At the turn of a switch, the plant is automatically shut down and a banked fire will be maintained for what appears to be an indefinite period of time, using from 1½ to 3 lb of coal per hr. Banked fires have been held for as long as 76 hours between runs. By repositioning the shutdown switch, the unit will automatically start up, gradually break the bank, re-establish ignition on the coking plates, and then go to full automatic operation with no manual attention required. Steam pressure has been reached in 25 minutes after starting from a bank with the boiler water temperature at 120 deg F, and a steam demand at 10 psi of 1200 lb per hr.

Complete tests with a variety of bituminous coals are now under way.

LIQUID METAL FUEL

under study by industrial group to evaluate engineering aspects of Brookhaven nuclear power reactor.

An engineering evaluation of a nuclear power plant system using liquid metal as fuel is underway at the Atomic Energy Commission's Brookhaven National Laboratory. The evaluation, or feasibility study, is being made by a group of 14 industrial and 3 other organizations, it was announced jointly by The Babcock & Wilcox Company, who is responsible for the work, and by the Laboratory.

Preliminary designs for the system known as the Liquid Metal Fuel Reactor were developed by Brookhaven. The system is intended to generate electric power, breed new fuel for itself, and deliver by-products to waste tanks, all in continuous processes. It would provide the first usage of a liquid metal alloy, in this case uranium-bismuth, as the fuel stream to interconnect continuous processes.

• **PARTICIPANTS.**—Babcock & Wilcox has organized and is in charge of the study. Seventeen scientists and engineers, working full time, and several more part-time consultants are engaged in the work, and will submit a final report June 30, 1955. The following organizations are providing either full-time or consulting specialists in addition to the engineers and physicists provided by Babcock & Wilcox: Air Reduction Co., American Gas and Electric Co., American Smelting and Refining Co., the Bailey Meter Co., Bechtel Corp., Carbide and Carbon Chemical Co., The Detroit Edison Co., Dow Chemical Co., The Ethyl Corp., The International Nickel Co., Inc., Merck & Co., Inc., National Carbon, Oak Ridge National Laboratory, Rensselaer Polytechnic Institute, Tennessee Valley Authority, Vanadium Corp. of America. American Gas and Electric and Bechtel are participating as representatives of the Nuclear Power Group and the Detroit Edison Company is participating as a representative of the Atomic Power Development Associates.

Under a lump sum contract, Babcock & Wilcox will receive $72,500 for supplying overall administration, as well as supervision, of this comprehensive analysis of Brookhaven data and preparation of a detailed report.

Since not all of the fundamental information pertaining to the reactor as it may be built is known at present, the overall evaluation will necessarily be based on certain assumptions in chemistry, physics, and engineering. An appraisal of the nature and scale of these assumptions and an estimate of their probable effect on the validity of the conclusions drawn will be made.

• **HEAD.**—Glen J. Schoessow of Babcock & Wilcox is heading the study group, while Robert T. Schomer is in charge at Upton. Dr. Clarke Williams is chairman of the Brookhaven Nuclear Engineering Department, which developed the liquid metal fuel scheme.

The U. S. Atomic Energy Commission has already authorized construction of six reactors as part of its five-year nuclear power plan. Construction has begun on the pressurized water reactor near Pittsburgh, and contracts have been let for the sodium-graphite reactor which North American Aviation Corp. is designing in California. Oak Ridge National Laboratory in Tennessee, and Argonne National Laboratory near Chicago, each will be responsible for two reactors in the plan, all of them to be completed prior to 1960.

HARD COAL

shows 40% gain in automatic equipment sales. Dealers convention sees new display trailer.

Sales of automatic hard coal heating equipment have spurted to new highs in the first seven months of the current heating season, Everett J. Decker, chairman of the Eastern States Solid Fuel Conference, announced as retail fuel dealers from New York State and New Jersey gathered with industry leaders for the first interstate solid fuel conference, March 31, at the Hotel Biltmore, New York.

"There is something new in the home heating market," the solid fuel leader stated, "with hard coal automatic equipment sales for the first seven months of the heating season registering more than 40% over the same period of the previous year."

The sharp upturn in automatic coal equipment sales marks the reversal of a long time trend in the coal industry, and according to Mr. Decker, "reflects increasing interest and awareness of the economy advantages of

(*Continued on page* 165)

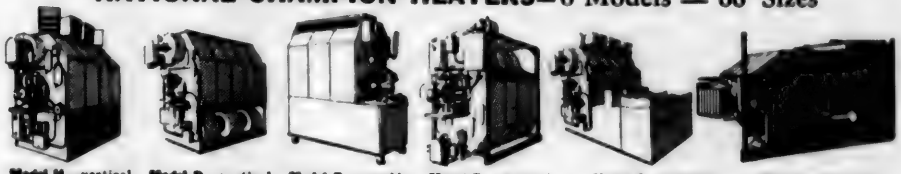
National Champion

DELIVERS THE KNOCKOUT PUNCH!

. . . to heating problems. If you're on the ropes with a heating need—space heating, tempering, make-up air, curing, drying or de-icing—there's a National Champion Heater to do the job. Check these winning points:

- 80% guaranteed heating efficiency
- Direct fired for gas, oil or combination fuels
- Completely automatic controls — for constant, clean heat
- 70%-150% more heat transfer area than similar units
- Quieter, smoother operation — lowest blower RPM
- Highest available external static pressures
- Electronic flame failure control
- Completely wired, assembled and flame-tested at the factory to guarantee peak performance
- Listing by Underwriters' Laboratories, Inc.

NATIONAL CHAMPION HEATERS—6 Models — 66 Sizes



Model H—vertical unit with discharge heads 17 sizes.

Model D—vertical unit for dust work. 12 sizes.

Model P—portable, vertical unit for flexible duty. 6 sizes.

Model R—inverted unit with discharge heads at bottom. 12 sizes.

Model S—vertical unit with side blow-ers to permit proper location of air mixing dampers. 12 sizes.

Model C—horizontal ceiling suspension unit for space saving. 12 sizes.

200,000 to 2,000,000 BTU Capacities

Write today for complete information and specifications.

NATIONAL HEATER COMPANY, INC.
2180 Cleora Avenue, St. Paul 4, Minnesota

Showing the 7½, 5 and 3 horsepower sizes of Frick Unit Air Conditioners.

Unit Air Conditioners

Pay For Themselves in Profits, Whether Used in Public Areas or For Cooling a Group of Rooms or Offices

They do this by attracting more trade, getting customers to stay longer, and to return more frequently. Employees are more alert, more loyal.

Frick air conditioning, whether as a packaged unit or a central system, offer these and other advantages. Our engineers are unbiased in recommending the equipment required: we make both unit conditioners and custom-built systems.

Check the Features of These Units:

- √ Greater net cooling
- √ Low air velocities
- √ Silent operation
- √ Five year warranty
- √ Water-cooled motors
- √ Insulated condensers
- √ Heating coils if wanted
- √ Rexton "Hammermatic" finish

See your Frick Branch or Distributor for the full facts or write now for Bulletin 522.

FRICK & CO.
WAYNESBORO PENNA. U.S.A.

DEGREE-DAYS FOR MARCH, 1955

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city.

AIR CONDITIONING, HEATING AND VENTILATING's 27th Year of Publication of Monthly Degree-Day Data

City	March			Season to Mar. 31, incl.*		
	1955	1954	Normal	1954-55	1953-54	Normal
Abilene, Texas (A)	275	343	344	2193	2251	2594
Albany, New York (A)	(a)	941	989	(a)	5514	6045
Albuquerque, New Mexico (A)	538	581	589	3865	3630	4030
Alpena, Michigan (C)	1162	1180	1156	6406	6056	6604
Anaconda, Montana (C)	1323	1202	1081**	6735	5830	6737**
Asheville, North Carolina (C)	(a)	596	572	(a)	3536	3677
Atlanta, Georgia (A)	(a)	387	404	(a)	2518	2673
Atlantic City, New Jersey (C)	658	706	729	4072	3637	4060
Augusta, Georgia (A)	(a)	337	308	(a)	2235	2076
Baltimore, Maryland (C)	(a)	601	611	(a)	3339	3804
Billings, Montana (A)	1199	1162	958	5864	5376	6091
Binghamton, New York (C)	(a)	1090	927	(a)	5262	5662
Birmingham, Alabama (A)	(a)	383	378	(a)	2488	2630
Bismarck, North Dakota (A)	1283	1268	1187	7379	6876	7839
Block Island, Rhode Island (A)	(a)	817	865	(a)	4181	4782
Boise, Idaho (A)	887	791	719	5492	4465	5096
Boston, Massachusetts (A)	(a)	806	849	(a)	4395	4972
Bozeman, Montana (C)	1333	1204	1096**	6884	5986	6993**
Buffalo, New York (A)	(a)	980	992	(a)	5184	5769
Burlington, Iowa (A)	838	903	822	5344	4905	5463
Burlington, Vermont (A)	(a)	1088	1107	(a)	6145	6739
Butte, Montana (C)	1355	1209	1048**	7152	6143	6683**
Cairo, Illinois (C)	492	531	523	3458	3291	3527
Charleston, South Carolina (C)	169	279	260	1791	1557	1726
Charlotte, North Carolina (A)	(a)	471	449	(a)	2785	3004
Chattanooga, Tennessee (A)	(a)	464	467	(a)	3004	3160
Cheyenne, Wyoming (A)	1116	1148	1029	5921	5416	6138
Chicago, Illinois (C)	848	914	845**	4963	4587	5246**
Cincinnati, Ohio (C)	(a)	691	645	(a)	3682	4110
Cleveland, Ohio (A)	(a)	920	874	(a)	4723	5196
Columbia, Missouri (A)	663	732	698	4346	4062	4632
Columbia, South Carolina (A)	(a)	329	318	(a)	2017	2207
Columbus, Ohio (C)	(a)	798	741	(a)	4008	4694
Concord, New Hampshire (A)	(a)	994	1029	(a)	5774	6486
Concordia, Kansas (C)	767	811	725	4692	4316	4816
Dallas, Texas (A)	276	315	288	2094	2085	2197
Dayton, Ohio (A)	(a)	630	781	(a)	4277	4938
Deer Lodge, Montana (C)	1293	1114	1056**	7121	5986	7125**
Denver, Colorado (A)	878	912	843	5111	4443	5240
Des Moines, Iowa (A)	902	980	868	5646	5216	5745
Detroit, Michigan (A)	900	970	927	5328	5006	5527
Devils Lake, North Dakota (C)	1564	1311	1314	8294	7691	8551
Dodge City, Kansas (A)	703	761	694	4318	4102	4561
Dubuque, Iowa (A)	1023	1054	983	6266	5750	6349
Duluth, Minnesota (C)	1474	1310	1252	7994	7457	7929
Elkins, West Virginia (A)	(a)	837	797	(a)	4961	4979
El Paso, Texas (A)	284	316	330	2457	2404	2531
Ely, Nevada (A)	1034	1024	921	6726	5860	6120
Escanaba, Michigan (C)	1226	1203	1203	6718	6343	7059
Evansville, Indiana (A)	586	655	589	4069	3871	4013
Fargo, North Dakota (A)	1487	1219	1231	8024	7397	8082
Fort Smith, Arkansas (A)	419	476	418	3014	3026	3037
Fort Wayne, Indiana (A)	840	925	874	5257	4898	5475
Fort Worth, Texas (A)	284	324	308	2136	2167	2266
Fresno, California (A)	337	401	304	2652	2389	2344
Galveston, Texas (C)	142	186	176	981	1005	1181
Grand Junction, Colorado (A)	816	766	738	5507	4585	5226
Grand Rapids, Michigan (A)	982	1046	1008	5754	5395	6041
Green Bay, Wisconsin (A)	(a)	1110	1132	(a)	6244	7019
Greensboro, North Carolina (A)	(a)	541	528	(a)	3304	3519
Greenville, South Carolina (A)	(a)	439	442	(a)	2656	2867
Harrisburg, Pennsylvania (A)	(a)	758	750	(a)	4321	5693
Hartford, Connecticut (A)	(a)	802	871	(a)	4742	5365
Hatteras, North Carolina (C)	(a)	361	394	(a)	1827	2196
Havre, Montana (C)	1279	1269	1076	6562	6363	7120
Helena, Montana (A)	1357	1160	1017	7008	5939	6952
Houston, Texas (C)	157	187	166	1116	1098	1249
Huron, South Dakota (A)	1130	1156	1032	6820	6408	6959
Indianapolis, Indiana (A)	751	842	772	4883	4501	4973
Jackson, Mississippi (A)	(a)	311	299	(a)	2048	2121
Kansas City, Missouri (A)	657	717	666	4186	3935	4477
Knoxville, Tennessee (A)	(a)	511	500	(a)	3197	3344
La Crosse, Wisconsin (A)	1123	1071	1035	6580	5848	6743

(a) Data not available.
*Heating season, cumulative, from Sept. 1.
**Same normal figures as previously listed by HEATING AND VENTILATING since new figures are not available. All other normal figures in this table are based on a 30-year period covering 1921 to 1950, inclusive, recently compiled and published by the U. S. Weather Bureau.

Figures in this table, with eight exceptions, based on local weather bureau reports. Exceptions are Utica and Lewiston, figures for which are furnished through the courtesy of Coke Sales Department, Central New York Power Corp., Utica, N. Y., and Norman E. Ross, Bursar, Bates College, Lewiston, Me., respectively; Anaconda, Bozeman, Butte, Deer Lodge and Livingston, Mont., through the courtesy of the Montana Power Company. Tacoma figures through the courtesy of the Tacoma News Tribune.

[Table concluded on page 152]

Your best

cancer insurance...

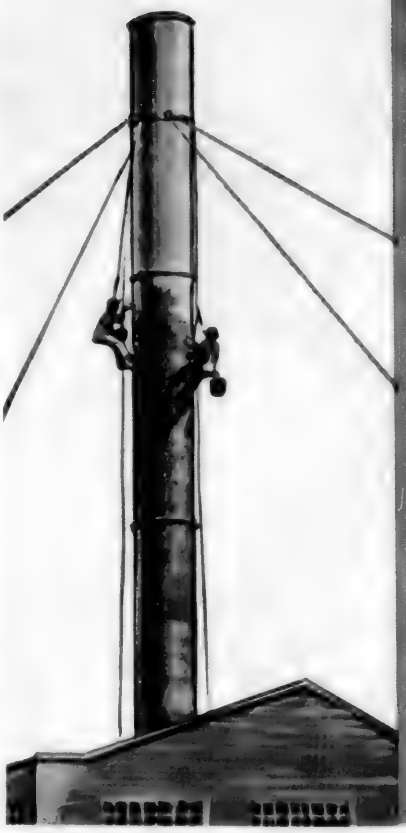
"LIFETIME" POLICY... See your doctor *every year* for a thorough check-up, no matter how well you feel.

"DAY-TO-DAY" POLICY ...See your doctor *immediately* at the first sign of any one of the seven danger signals that *may* mean cancer (1) Any sore that does not heal (2) A lump or thickening in the breast or elsewhere (3) Unusual bleeding or discharge (4) Any change in a wart or mole (5) Persistent indigestion or difficulty in swallowing (6) Persistent hoarseness or cough (7) Any change in normal bowel habits.

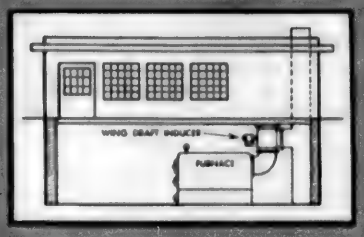
Many cancers can be cured, but only if properly treated *before* they have begun to spread or "colonize" in other parts of the body.

For *any* information about cancer just call the American Cancer Society or write to "Cancer" in care of your local Post Office.

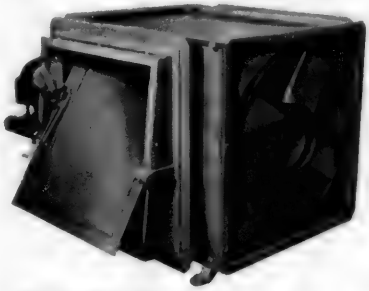
American Cancer Society



The next time your stack needs painting or repairing... ...think of WING DRAFT INDUCERS



Natural draft is costly. Steel stacks require periodic painting; still they rust and corrode and need repair and replacement. Brick chimneys need periodic pointing. A Wing Inducer and an inexpensive stub stack to clear the roof, is all you need. And you get positive, adequate draft at all times, regardless of wind or weather. ***Write today for bulletin. Use the coupon.***



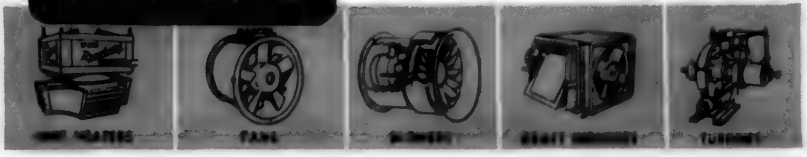
WING DRAFT INDUCER SHOWING AXIAL FLOW FAN AND BAROMETRIC DAMPER (Optional)

L. J. Wing Mfg. Co. 158 Vreeland Mills Road, Linden, N.J.

Factories: Linden, N. J. & Montreal, Canada

L. J. Wing Mfg. Co., Linden, N. J. ACHV-5
Please send me bulletin on WING DRAFT INDUCERS.
Name .....
Firm .....
Address .....
City ..... Zone State .....

Wing



Degree-Days for March, 1955 (Concluded)

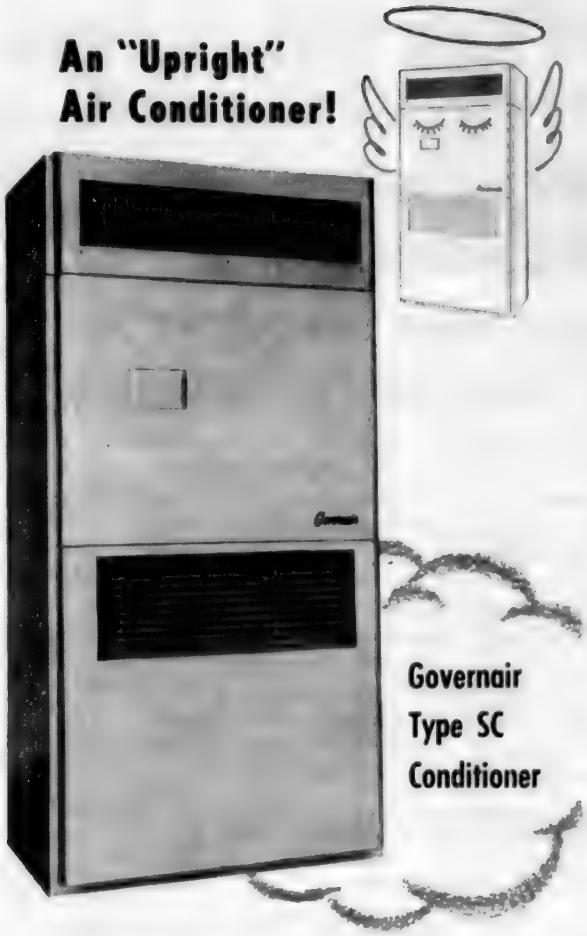
(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city.

AIR CONDITIONING, HEATING AND VENTILATING's 27th Year of Publication of Monthly Degree-Day Data

City	March			Season to Mar. 31, incl.*		
	1955	1954	Normal	1954-55	1953-54	Normal
Lander, Wyoming (A)	1199	1180	1045	6521	5797	7027
Lewiston, Maine (O)	1025	1004	1093**	6183	5990	6625**
Lincoln, Nebraska (C)	839	901	794	5196	4785	5277
Little Rock, Arkansas (A)	388	395	401	2787	2681	2842
Livingston, Montana (C)	1178	1178	967**	6187	5627	5985**
Los Angeles, California (C)	142	242	212	1034	935	1235
Louisville, Kentucky (A)	(a)	650	611	(a)	3743	4055
Lynchburg, Virginia (A)	(a)	601	584	(a)	3533	3777
Macon, Georgia (A)	(a)	291	275	(a)	1948	1987
Madison, Wisconsin (C)	1067	1034	1011	6240	5618	6342
Marquette, Michigan (C)	1241	1191	1181	6752	6256	6918
Memphis, Tennessee (A)	(a)	423	427	(a)	2766	2974
Meridian, Mississippi (A)	(a)	324	309	(a)	2189	2239
Milwaukee, Wisconsin (A)	1021	1028	983	5838	5431	6072
Minneapolis, Minnesota (A)	1211	1145	1057	6957	6271	6919
Moline, Illinois (A)	891	953	862	5610	5132	5659
Montgomery, Alabama (A)	(a)	307	288	(a)	1997	2057
Nantucket, Massachusetts (A)	(a)	849	880	(a)	4324	4871
Nashville, Tennessee (A)	(a)	512	498	(a)	3193	3284
New Haven, Connecticut (A)	(a)	820	865	(a)	4631	5128
New Orleans, Louisiana (C)	127	190	163	1101	1071	1156
New York, New York (C)	733	729	753	4362	3864	4423
Newark, New Jersey (A)	(a)	728	760	(a)	4083	4643
Norfolk, Virginia (A)	(a)	499	500	(a)	2821	3130
North Platte, Nebraska (A)	950	1007	887	5959	5352	5738
Oak Ridge, Tennessee (C)	(a)	533	(a)	(a)	3042	(a)
Oakland, California (A)	386	422	360	2470	2205	2389
Oklahoma City, Oklahoma (A)	491	524	472	3265	3070	3312
Omaha, Nebraska (A)	880	920	831	5347	4868	5559
Parkersburg, West Virginia (C)	(a)	729	672	(a)	3985	4271
Peoria, Illinois (A)	836	910	828	5229	4827	5408
Philadelphia, Pennsylvania (C)	(a)	671	667	(a)	3608	4061
Phoenix, Arizona (A)	117	206	175	1396	1346	1430
Pittsburgh, Pennsylvania (C)	(a)	782	735	(a)	4094	4496
Pittsfield, Mass. (A)	(a)	1024	1060	(a)	5912	6475
Pocatello, Idaho (A)	1076	954	880	6632	5216	5962
Portland, Maine (A)	(a)	1026	1039	(a)	5855	6406
Portland, Oregon (C)	686	594	515	3528	3236	3500
Providence, Rhode Island (A)	(a)	828	874	(a)	4704	5213
Pueblo, Colorado (A)	774	818	775	4781	4249	5023
Raleigh, North Carolina (A)	(a)	478	440	(a)	2748	2874
Rapid City, South Dakota (A)	1119	1150	1045	6001	5357	6359
Reading, Pennsylvania (C)	(a)	722	725	(a)	4065	4510
Red Bluff, California (A)	(a)	424	336	(a)	2273	2318
Reno, Nevada (A)	808	833	756	5356	4664	4946
Richmond, Virginia (A)	(a)	551	550	(a)	3295	3618
Rochester, New York (A)	(a)	1013	992	(a)	5333	5862
Roswell, New Mexico (A)	418	418	443	3232	3066	3211
Sacramento, California (C)	319	404	317	2555	2229	2314
St. Joseph, Missouri (A)	794	793	648	4844	4443	4294
St. Louis, Missouri (C)	611	670	620	3999	3609	4098
Salt Lake City, Utah (A)	871	813	741	5560	4042	5099
San Antonio, Texas (A)	168	194	190	1213	1362	1545
San Diego, California (A)	163	234	223	1065	987	1265
Sandusky, Ohio (C)	(a)	884	853	(a)	4526	5088
San Francisco, California (C)	311	396	317	2114	1864	1996
Sault Ste. Marie, Michigan (A)	1379	1335	1302	7378	6994	7671
Savannah, Georgia (A)	(a)	272	238	(a)	1664	1667
Scranton, Pennsylvania (C)	(a)	865	859	(a)	4827	5282
Seattle, Washington (C)	721	626	558	3598	3423	3595
Sheridan, Wyoming (A)	1298	1182	1035	6375	5730	6642
Shreveport, Louisiana (A)	249	293	272	2008	1982	2056
Sioux City, Iowa (A)	985	1047	930	5956	5573	6231
Spokane, Washington (A)	1041	882	834	5835	5212	5770
Springfield, Illinois (A)	762	791	713	4828	4221	4734
Springfield, Missouri (A)	620	672	632	4077	3822	4256
Syracuse, New York (A)	(a)	975	955	(a)	5297	5637
Tacoma, Washington (C)	741	630	595	3761	3485	3878
Toledo, Ohio (A)	(a)	950	905	(a)	4967	5522
Topeka, Kansas (C)	702	735	669	4401	4029	4499
Trenton, New Jersey (C)	(a)	719	735	(a)	4010	4495
Tulsa, Oklahoma (A)	461	520	485	3098	3060	3367
Utica, New York (O)	1021	1037	989**	6148	5675	5955**
Valentine, Nebraska (C)	1041	1127	970	6030	5354	6140
Walla Walla, Washington (C)	748	686	564	4269	3802	4301
Washington, D. C. (C)	(a)	621	606	(a)	3454	3864
Wichita, Kansas (A)	654	687	619	4042	3850	4183
Williston, North Dakota (C)	1359	1309	1194	7347	6945	7836
Winnemucca, Nevada (A)	855	910	794	6077	5011	5396
Yakima, Washington (A)	858	789	660	5166	4807	5172

For footnotes, see page 150.

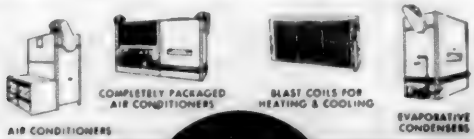
An "Upright" Air Conditioner!



Yes, this is an *upright* Governair self-contained conditioner—but that's not the reason for the halo.

The halo is there because this air conditioner behaves itself! Built to perform true air conditioning quietly and efficiently . . . it does just that! Flexibility, compact design, easy installation, dependability and economy are among its many virtues.

Available in capacities from 3 to 15 tons, the Governair Type SC Conditioner is the answer to your air conditioning needs in commerce, institutions, factories and homes. Choose *Governair* . . . originators* of completely packaged air conditioners!



GOVERNAIR

*Type SCU Conditioners Patent No. 2,397,938

GOVERNAIR CORPORATION • 513 N. Blackwelder • Oklahoma City, Okla.

There's No Time Limit on BOILER SAFETY!

A magnetic sleeve, rising and falling within a non-magnetic tube, "trips" or releases an Alnico permanent magnet attached to a mercury switch. Basically, this is Magnetrol.

...and only **MAGNETROL**

Gives You a Boiler Water Level Control with UNLIMITED OPERATING LIFE

In Magnetrol you have a control mechanism that eliminates the causes of eventual failure *inherent in other controls*. Gone completely are the bellows, diaphragms, electrodes, packing boxes and glands that *must* fail or require servicing sooner or later.

Instead Magnetrol operates by infallible magnetic force. This is the safest system known because it actually makes failure all but impossible! The actuating magnet is rated at 98% of initial strength after 30 years of service.

Magnetrol—and Magnetrol alone—offers UNLIMITED OPERATING LIFE, with least servicing and simplest maintenance.

Magnetrol units are available in single or multi-stage models for all boiler water control applications. Standard boiler units for pressures of 25 to 600 lbs. WSP.

MAGNETROL, Inc.

MAIL THE COUPON NOW FOR FULL FACTS

MAGNETROL, Inc., 2106 S. Marshall Blvd., Chicago 23, Ill.
Gentlemen: Please send me Catalog Section III and full information on Magnetrol Boiler Water Level Controls.

NAME_____

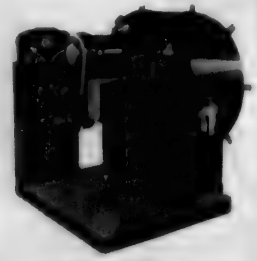
COMPANY NAME_____

ADDRESS_____

Horizontal rotary, heavy oil burners, 7½ to 175 g.p.h. Bulletin 175.

Combination oil and gas burners 15 to 90 g.p.h. Bulletin 176.

"Packaged" pump and heater set; for oil delivery of 110 to 1200 g.p.h. Bulletin 1630B.



"THERMOPAK" automatic oil or gas combustion system, completely packaged for all boilers. Bulletin 185.

Rotary burners for heavy oil, tar or pitch—50 to 400 g.p.h. Bulletin 150.

The Easy Way to Buy Heating Equipment

PREFERRED UTILITIES

Offers a Single Dependable Source that Saves You Time and Money

Buying heating equipment from different sources, each with different specifications and standards of quality, can prove as confusing and dangerous as buying a boiler in parts and then having to put it together and make the assembly function properly.

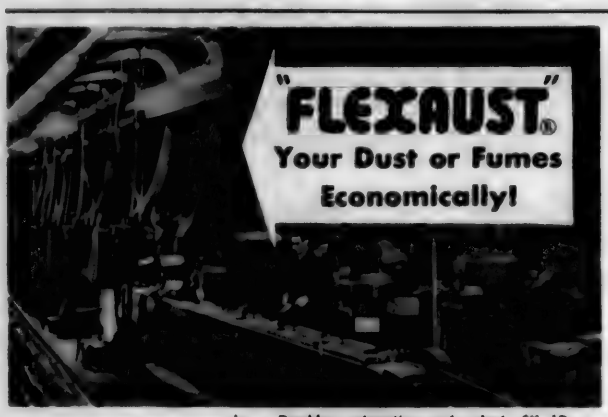
It's simpler, more economical, safer to buy industrial and commercial burner equipment from a single, dependable manufacturer who knows what your jobs require to make all the equipment work right.

Preferred Utilities is a pioneer and leading developer and producer of the most extensive, high quality line of automatic oil burning and combination oil- and gas-burning equipment and accessories—engineered to meet the highest standards of performance.

It will pay you to investigate the advantages of Preferred Utilities heating equipment. Write for bulletins.

PREFERRED UTILITIES MFG. CORP.

1860 BROADWAY Dept. H NEW YORK 23, N. Y.



In a Brooklyn automotive parts plant, 6" ID FLEXAUST is used for removing dust and grit on automatic grinding and buffing operations.

If you have a problem of dust or chip collection . . . of fume control or ventilation . . . you can solve it with FLEXAUST hose. **No Layout or Design Problems!** FLEXAUST hose can be cut and installed quickly. It can be bent to conform to any installation requirement. It can be changed to fit any change in machine set up or process. Available in 1¼" to 36" I.D.

Durable! Made of Neoprene impregnated cotton or nylon, spiral wire reinforced, it is highly resistant to flexing, aging, abrasion or corrosion. Its bonded, double ply, double overlap construction makes it ideal for pressure, suction or gravity operations. Can be connected to any type of duct work.

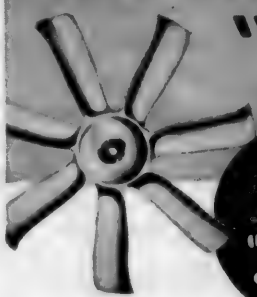
Write today for bulletins giving complete data on flow characteristics, installation procedure, sizes and prices.

THE FLEXAUST* COMPANY

Dept. HV-5, 100 Park Avenue, New York 17, N. Y.
Formerly American Ventilating Hose Co.

FLEXAUST* FORTOVENT* BLOFLEX*
*Trade-marks

performance is in the "prop"



NEW Aerovent "Semi-Pressure" FANS

7-Blade "Machete" Airfoil Propeller

Now get top efficiency against resistances to 4½" SP *without* special equipment! Standard Aerovent units with new 7-blade propellers move more air at *slower* motor speeds with *less* horsepower. Write for folder.

Ask for bulletin S-501

All Aerovent Fans are rated in accordance with the Standard Test Code and U.S.D.C. Comm. Std. CS178-51.

Aerovent Fan Company, Inc.

Ash and Brandt Streets Piqua, Ohio

Ad-Digest SERVICE

AUTOMATIC SHUTTERS. Page 173. These automatic shutters are sensitive to air currents yet are rattle-proof. They have a swivel joint that does not wear loose. Made in sizes from 12 to 72 in., they are also available in rectangular shapes. Write for circular and prices; free catalog available. .....Item 201

VENTILATING A STEEL MILL. Page 61. This company's industrial heaters, centrifugal fans, air handling units, and electronic air cleaners clean, heat, and distribute over 5-million cfm of air at a giant steel works. Facts are available from the company on heating, air handling and electronic air cleaning.....Item 202

FORCED HOT WATER HEATING. Page 3. A Chicago heating contractor has used this company's modern system for wall to wall heating in homes, apartments, motels, country clubs, trucking terminals, stores, medical centers, and many other types of buildings. He also installed the company's baseboards to modernize the heating in about 50 homes. A 40-minute, 16-mm sound motion picture about the baseboard heating is available through the company's representatives. .....Item 203

METAL FRAME PIPE RACKING. Page 51. Heavy lines are easily supported on this sturdy metal framing. Clamps, concrete inserts, hangers and rollers are among the many accessories for the framing. No welding or drilling is required to install it, and additions or alterations can be made at any time. Information on a motion picture film about the framing is available. .....Item 204

SPLIT CAPACITOR MOTOR. Page 163. A new type capacitor motor makes large, direct-drive blowers practical. Manufacturers can reduce installation costs by eliminating belts, blocks, pulleys, and motor mounts that this motor does not require. The motor has a low starting current, a gradual torque build-up, an 80% power factor, and produces 1/3 hp running at 1075 rpm and consuming 497 watts. Specifications available. .....Item 205

GLASS FIBER DUCT INSULATION. Page 42. Aluminum foil-faced duct insulation was installed on the new air conditioning system at the Atlantic City Convention Hall. The job involved approximately 16,000 sq ft of duct insulation. The insulation is pliable and will conform to irregular contours. The glass fibers of the insulation will not burn or absorb moisture. Installation instructions available.....Item 206

CENTRIFUGAL PUMPS. Page 161. Low cost centrifugal pumps with mechanical seals, balanced bronze impellers, and ball bearings can be used for air conditioning and for circulation jobs. The unit pumps are available in sizes from ¼ to 7½ hp. Other unit pumps are also available from 2 to 50 hp and heads to 300 ft with capacities from 1000 gpm. Write for catalog. .....Item 207

RESERVE STEAM. Page 50. The two boilers installed in a large modern bakery plant in Texas provide for fluctuating loads and future expansion. The boilers were built with 50% extra power for additional capacity requirements.....Item 208

WROUGHT IRON TUBING. Page 3. Cold drawn wrought iron tubing is made by this company for heat exchangers and condensers. Because its composition and structure are the same as wrought iron pipe, the tubing can be used on ammonia condensers, heat exchangers, pre-heaters, evaporators, cooling pipe, and steam condensers. .....Item 209

AUTOMATIC CONTROL SYSTEM. Page 139. The new addition to the headquarters building of a telephone company, has its radiators, convectors, and re-heat coils individually controlled with electronic outdoor resets on the hot water supply. The electric-electronic controls are also used in the modernization of the company's 19-story older building. The controls for the lobby compensate for heat loss through the front doors. Data and engineering service are available on automatic control problems. .....Item 210

REFRIGERANT INDICATORS. Page 143. Advance design of these refrigerant indicators, which use a sight glass, keeps refrigerant losses to a minimum. Engineers dealing with fluid flow problems associate the name of these indicators with engineering assistance. A company representative will help in the choice of an indicator. Send for catalog.....Item 211

TAPERED COIL FINS. Page 13. This company's heating and cooling coils have fins which are tapered with a wide base that conducts sufficient heat between the fan and tube to make the entire fin an effective transfer surface. The wide base provides ample contact surface. The air resistance of the coils is lowered by this type of fin; higher air velocities can then be used. Write for bulletin.....Item 212

ADJUSTABLE AIR DIFFUSERS. Page 52. This air diffuser can control the air direction at four different angles of discharge simultaneously without changing the position of the spinnings. It can be adjusted for downward projection, horizontal discharge, intermediate projection, and horizontal discharge and downward projection. Bulletin available. .....Item 213

AIR FILTER ENGINEERING. Page 44. A filter engineer discusses how to compare air filters by using standardized test conditions; how his firm tries to make the lightest possible filter; and presents a chart as a rough guide to the selection of the type of filter to use under a given dust condition. .....Item 214

STEEL PIPE. Page 56. Modern living calls for plenty of water and plenty of pressure from automatic water systems. Both the water and pressure depend directly on proper sized pipe. The steel pipe is sized for future additions and extensions to a water system. .....Item 215

SOLVING AIR MOVING PROBLEMS. Pages 26-27. The solution to air moving problems is an engineered installation of fans and blowers. This fan and blower manufacturer produces its own motors for its variety of blowers and exhaust fans. Two catalogs are available. .....Item 216

HEAVY OIL HEATER. Page 180. Good oil heaters are needed for burning or moving heavy fuel oil. These oil heaters are made for any application requiring heating for burning or bulk movement of oil. They are suitable for heating the oil with hot water or steam. Catalog available.....Item 217

HEADS FROM 6 TO 600 FEET. Page 171. Neither height, capacity, nor horsepower rating are objects for a newly expanded pump line with over 200 standard models covering capacities from 5 to 2500 rpm and heads to 600 ft. They are available for practically all normal air conditioning requirements. Three classes of pumps range from 1/3 to 150 hp.....Item 218

UNIT AIR CONDITIONERS. Page 149. Unit air conditioners, for use in public areas or for cooling a group of rooms or offices, are manufactured as a packaged unit or a central system with water-cooled motors, insulated condensers, a 5-year warranty, and heating coils, if wanted. The company manufactures both unit conditioners and custom built systems. Bulletin available. .....Item 219

Below and on the following pages are given brief digests of the advertisements appearing in this month's issue. Use this Digest to locate and refer to the advertisements in which you are particularly interested, then fill out and mail the prepaid postcard to request further information from manufacturers.

NOTE: While every attempt is made to list all advertisements, those which are received after the published closing date may not appear. The Index of Advertisers lists all the advertisments in this issue.

Circle numbers corresponding to the advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

PLEASE SEND US MORE INFORMATION

Circle below item numbers on which you wish further information.

201	202	203	204	205	206	207	208	209	210	211	212	213	214
215	216	217	218	219	220	221	222	223	224	225	226	227	228
229	230	231	232	233	234	235	236	237	238	239	240	241	242
243	244	245	246	247	248	249	250	251	252	253	254	255	256
257	258	259	260	261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280	281	282	283	284
285	286	287	288	289	290	291	292						

PLEASE PRINT May AD-55

This service available only to U. S. and Canadian readers

Name..... Title.....

Firm .....

Nature of Firm's Business.....

Street .....

City..... Zone..... State.....

This card is void after Aug. 1, 1955

Ad-Digest SERVICE

AXIAL FLOW FANS. Page 45. The design of axial flow fans offers advantages such as straight-line efficiency, light weight, and space savings. In addition to axial flow fans, this company builds all types, including centrifugal and propeller fans. Bulletin available with fan details.....Item 220

TWO BOILER WATER CONTROLS. Back cover. A heating contractor installed two boiler water controls for each boiler in a Texas hospital. One control cuts the gas off when the water is even with the top tubes. The other starts and stops the boiler feed pump at the proper water level. The controls are rated for 150 psi.....Item 221

AVAILABILITY OF STEEL PIPE. Page 74. Steel pipe is good if you can get it when and where you want it and in the sizes and grades that you need. Steel pipe is available from thousands of jobbers and distributors throughout the land. The manufacturers of steel pipe acknowledge the contribution of their jobber and distributor outlets.....Item 222

GALVANIZED SHEETS CHALLENGED. Pages 14-15. Galvanized sheets are challenged to make anything that can be made of steel sheets. The galvanized sheets can be worked to the limit of the base metal, are ductile and tight-coated and can be beaded, drawn, or seamed. Put the galvanized sheets to the test. Information available.....Item 223

FOUNDRY VENTILATED IN VALLEY. Page 104. Fifteen 30-in. ventilators in an industrial valve company's iron and bronze foundry and eleven 36-in. units in its brass foundry change the air every 3½ minutes. Located in a valley with no natural air movement, the foundry's other buildings are ventilated by exhaust fans spaced 60 in. apart. The air in these buildings is changed every 4½ to 5 minutes. Roof ventilator data book available.....Item 224

CUSTOM-TAILORED COOLING. Pages 28-29. Twenty-seven large resort hotels have engineered air conditioning systems to fit each hotel because, as in all large buildings, glass areas, heat loads, floor areas, numbers of rooms, and economic considerations varied from hotel to hotel. This knowledge and experience can be applied to your building.....Item 225

FRESH AIR MANUFACTURERS. Page 37. Air recovery units that use activated carbon to manufacture fresh air, eliminated the need for two large ducts in a skyscraper; cut the required air intake in half in another building; and reduced the required boiler capacity of a large industrial plant. Let the company show you how you can improve your air conditioning and ventilating layouts. Write for complete information.....Item 226

PLANNED FIRING SYSTEMS. Pages 20-21. Balanced firing is no accident, it must be planned. Firing systems are available as packaged boiler-burner units or as separate packaged burners for installation in existing boilers. The burner units are made with single or dual-fuel systems, forced draft air supply, combustion refractory, and wired and tested controls. The controls are changed from gas of any type to heavy oils by the flick of a switch. Technical information available....Item 227

INSULATE ANY SHAPE DUCT. Page 62. Flexible duct insulation can be used to insulate round or rectangular shaped ducts on the inside as well as the outside surface. The insulation is light, it is thermally efficient, labor saving, it has acoustical properties, and is made in a wide range of densities, sizes, and thicknesses. It is made from a rock proof moisture-resistant material. Technical data available.....Item 228

AIR CONDITIONER BEHAVIOR. Page 122. An upright self-contained air conditioner that is built to perform true air conditioning has flexibility, compactness, dependability, and economy among its virtues. Available in capacities from 2 to 15 tons, it is designed for air conditioning needs in commerce, institutions, factories, and homes.....Item 229

CHOICE OF AIR FILTER GAGES. Page 164. Air filter gages that are precision instruments are made in three types: inclined tube, diaphragm-actuated dial, and bell-actuated dial. The gages are used in public buildings, hotels, hospitals, and office buildings. Air filter gage bulletin available.....Item 230

CABINET UNIT HEATERS. Page 162. Cabinet unit heaters for cold reception rooms, lobbies, vestibules, and entrances of commercial establishments are made in floor, ceiling, and semi-recessed wall models for both steam and hot water. Every unit has a blower, directional air louvers, and nonferrous tubes and fins. Model sizes, feature story, and selection data available. Item 231

WATER TUBE BENDS BY HAND. Page 79. Soft temper copper water tube for radiant heating jobs can be bent by hand. Its long 60 and 100-foot lengths require fewer joints. It can be joined with leak-proof solder-joint fittings using standard soldering techniques.....Item 232

COOLING TOWER APPLICATIONS. Page 188. Two cooling towers on the roof of a large industrial plant cool a total of 6850 gpm of water. Two other towers are used in the air conditioning systems of commercial buildings. One serves a store using 500 tons of the refrigeration, the other a tall office building using 525 tons of air conditioning. The company manufactures towers from residential types of 3 gpm to towers of 15,000 gpm. Engineering help available.....Item 233

ACRES OF AIR CONDITIONING. Pages 58-59. Of the 7400 tons of refrigeration required by an aircraft plant, 6800 tons are applied by this company's equipment. The equipment air conditions more than 3-million sq ft of factory, office, and hangar space, the equivalent of nearly 70 acres. The units control humidity and maintain indoor temperatures from 75 to 85 deg F. In a guided missile hangar, 21 units change the air every 12 minutes. Engineering assistance in special problems is offered.....Item 234

YEAR-LONG AIR FILTER CURTAIN. Page 67. A roll of air filter media that is 5 ft wide and 70 ft long is a year's supply under normal operating conditions. When rolled it is 13 in. in diameter and can be installed in a section up to 11 ft high, or 18,000 cfm. The curtain is renewable and its movement is controlled by an automatic time switch. Bulletin available....Item 235

LIQUID LEVEL CONTROLS. Page 73. A remote control for non-corrosive liquids with specific gravity of 0.5 or more can be used to ring an alarm control, a pump, or operate electrical devices. Another float switch will maintain the level of Freon, methyl chloride, and ammonia to within a ¼-in. differential. The switch makes the circuit when the level drops and breaks it when the level rises. Bulletins available.....Item 236

CUT PIPING LAYOUT COSTS. Page 143. A pipe fabrication service can save time, material, and labor costs by eliminating numerous flanged joints and combining several fittings into one integral unit. All types of materials are fabricated according to your specifications in sizes from 3 to 44 in. in diameter and thicknesses to ⅝ in. Write for bulletin.....Item 237

DAMPER HARDWARE. Page 149. By eliminating the bending of the connecting rod, this damper hardware avoids the main cause of damper binding. The hardware will compensate for the rod if it is placed off center, at an angle, or not at equal distances from the axis of the blades.....Item 238

AIR CONDITIONED TEST CABINET. Page 147. An air conditioned unit enclosed in an insulated cabinet adjoining a test cabinet is used to determine the effects of controlled temperature and humidity conditions on test subjects. Its temperature range is from 0 to 130 deg F, d. b. Its humidity range is from 5% to 95% with air capacities of 200, 400, or 800 cfm. Write for information.....Item 239

DRAFT CONTROLS. Page 165. You can eliminate heavy fuel wastes with complete safety by installing these draft controls made for commercial and industrial gas heating. Leading gas companies recommend them. Technical information and performance data are available....Item 240

VALVE HOLDS HIGH VACUUM. Page 81. A packless diaphragm valve, whose diaphragm seals the bonnet only, holds a line vacuum within a few microns of absolute to a dehydration process. The valve's positive seating disc controls fluid even should the diaphragm fail. Write for circular.....Item 241

ENGINEERED STEAM TRAPS. Page 170. An inverted bucket steam trap with a guided bucket receives compliments from the chemical, refinery, plastic, and contracting industries. The valve and seat are made of chrome nickel alloy. The three pipe connections in the head permit the valve to be installed straight-in-line or at an elbow. Thirty-six page book available.....Item 242

MOTOR SOLVES COOLER PROBLEM. Page 166. The method of mounting the capacitor of a split capacitor motor solved the problem of replacing existing motors of sealing jet unit coolers in the field. The motors are 1/10-hp, 1140-rpm, type-C units. Advice on motor problems offered.....Item 243

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VENTILATOR DESIGN. Page 160. A graph illustrates the design of a centrifugal housing based on proportionally increasing discharge areas. Both these direct and V-belt driven fans and their spun aluminum housing are the products of research and development. Literature available. .....Item 204

DAMPER REGULATORS. Page 187. Damper regulators for the heating, air conditioning, and metal working industries are now in full production by this company. The company also manufactures pre-assembled flexible duct connector material. Available in canvas, woven asbestos, or Neoprened Fiberglas fabric. Catalog available. .....Item 205

VENTILATION. Page 145. Where the problem is ventilation, the solution is this company's system. Its rotary ventilators, with or without fans, can do the most for you. A 2 mph wind operates this company's rotary and it continues to exhaust during wind lulls due to its balanced design. Information available.....Item 206

EXPANSION JOINTS. Page 41. These expansion joints are packed with a gun and will operate smoothly as frequently as required over long full-traverse up to 12 inches for the single type or 24 inches for the double type with no danger of metal fatigue or failure. They can be serviced under full steam pressure. Bulletin available. .....Item 207

RADIANT HEATING OF CHURCH. Page 125. Five thousand feet of copper water tube in sizes ranging from ¾ to 1¼ in. was used in the radiant panels of this church. Only one solder or compression fitting was needed every 60 ft. Technical advisory service available.....Item 208

EQUIPMENT USED IN PROJECTS. Page 139. Eighty-seven per cent of one city's 51 biggest postwar projects that use such equipment, used this company's instantaneous hot water heaters, storage water heaters, preheaters, condensate coolers, converters, or Freon coolers.....Item 209

DIRECT-FIRED HEATERS. Page 164. Direct-fired heaters give heat when and where you need it at the flick of a switch, which saves on low initial cost, and have full automatic controls. Available for gas, oil, coal, or dual gas and oil. Information available.....Item 210

TANKS AND TANK LINING. Page 169. This company is a specialist on tank fabrication at low cost and on tank linings of various types. Literature available. .....Item 211

AIR CONDITIONING SILENCER. Page 75. These silencers are incorporated as part of the duct work. Where an entire system is to be silenced they may be inserted between the fan and the first length of duct. For areas requiring special silencing, two units may be joined in series. They are available in fourteen standard sizes and eight types to meet a variety of conditions. Information available.....Item 212

PIPE HANGERS AND SUPPORTS. Inside front cover. These hangers consist of concrete inserts used for pipelines up to 12 in. and are furnished tapped for ⅜ to ⅞-in. hanger rods. An adjustable swivel pipe ring of malleable iron is made in twelve sizes with a load range of 80 lbs for ¾-in. sizes to 1510 lb for 8-in. sizes, and a locking swivel shank.....Item 213

UNDERGROUND PIPE INSULATION. Page 77. A triple-zone insulation for lifetime protection of hot underground pipes. The first zone is a dense semi-plastic core of the insulant which is fused on by the pipe's own heat; zone 2 is a sintered zone of the insulating particles; while zone 3 is unfused insulation providing a final margin of thermal insulation with a high load carrying capacity. Descriptive literature available. .....Item 214

AIR FILTERS. Page 40. Whether you need filters for packaged air conditioners or furnaces, for general filtration, or for special applications requiring the highest efficiency and greatest dirt capacity, this company has a standard type to fit the job. Available in steel, aluminum, copper, stainless, and monel. Information available. .....Item 215

ONE PUMP WITH SIX MOUNTINGS. Page 127. A single air conditioning pump can be mounted by six different methods. You can get a single set of operating characteristics using four different models that can be installed in any of six different ways. Bulletins are available.....Item 216

UNIT HEATERS. Page 173. Oil-fired unit heaters are manufactured by this company with outputs from 112,000 to 280,000 Btu per hr. The company has representatives in major cities. Twelve-page catalog available.....Item 217

VENTILATORS. Page 139. This company's ventilators are made in both blower or propeller types. The units are easy to install, are all aluminum, have a low silhouette, and their motor is sealed from the air stream. Catalog available....Item 218

UNIT COOLER. Page 173. A ceiling type cooler for food processing and storage is designed especially to conserve space, maintain proper temperature, produce even air motion, and reduce shrinkage. Folder available. .....Item 219

LOW PRESSURE HEATING PACKAGE. Page 71. A packaged boiler unit, which is fire-tested and shipped as a unit, has rear furnace walls, is water jacketed, and does not require a rear wall refractory. It is rated on the basis of 5.3 sq ft of heating surface per boiler hp with a gross output based on 5.0 sq ft of heating surface per boiler hp. Catalog available.....Item 220

WELDED MOTOR-COMPRESSORS. Page 45. Heavy-duty, high-power-factor motor delivers plenty of power with minimum current consumption. Freon-12 and Freon-22 models available. Use of Freon-12 can give you as much as 75 deg F lower temperatures in windings, crankcase, oil, and discharge side. Information available. .....Item 221

FANS. Page 154. The performance of these fans is in the prop design. Get top efficiency against resistances to 4½-in. static pressure, without special equipment, with these 7-blade propellers that move more air at slower motor speeds with less horsepower. Bulletin available.....Item 222

WATER HEATING-COOLING UNITS. Page 60. A new unit is designed for cooling and heating the peripheral zone of office buildings, hotels, and other buildings which use interior ventilation systems. Available in 300, 300, 400, and 600-cfm sizes, and designed for total recessing, the unit has a three-speed fan control which provides a wide range of air quantities and heating and cooling capacities.....Item 223

STEAM TRAPS. Page 64. The snap-action feature of these steam traps eliminates wire drawing. The valve action of the trap is instantaneous. It is either wide open or tight shut. The valve steam travels independently of the bucket. Information available. .....Item 224

CENTRIFUGAL REFRIGERATION. Page 42. A 315-ton centrifugal refrigeration system, along with air handling equipment and pumps, carries the entire cooling load for an air terminal's 3-million cu ft of space. Information available.....Item 225

PIPELINE SHOCK ABSORBERS. Page 181. Shock absorbers eliminate the shock in a pipeline that results from the sudden closing of a valve or spring operated mechanism. They are easily and inexpensively installed. Descriptive literature available. .....Item 226

INDUSTRIAL AIR HEATERS. Page 149. Industrial air heaters with a teardrop combustion chamber are made for space heating, tempering make-up air, curing, drying, or de-icing. There are 6 models and 66 sizes made with capacities from 200,000 to 3-million Btu per hr. Information and specifications are available....Item 227

VIBRATION CONTROL. Page 161. A case history of the use of this company's vibration control in an office building where 41 pieces of refrigeration equipment were installed in two penthouses. This vibration isolation reduces transmitted vibration and permits installation anywhere in apartment, public and industrial buildings, and decreases the original building and foundation costs. Bulletin available. .....Item 228

POWER ACCESSORIES. Pages 16-17. Use this combination of control motor and V-belt drive to save design time, cut manufacturing costs, and insure efficiency. Nationwide service is available from 76 district offices and almost 100 certified service shops located in industrial areas in the country. Engineering literature available. .....Item 229

RE-RATED POLYPHASE MOTORS. Page 80. This line of polyphase, drip-proof, general purpose, ball bearing motors have been re-rated to the new NEMA standards. They are now made in smaller frames. The motor feet are cast as an integral part of the frame, and the air intakes are located at the bottom of the inplates, with one air outlet on each of the bases of the frame. The company also makes motors with resilient mountings and sleeve bearings up to 5 hp. Bulletin available. .....Item 230

Use this digest to locate and refer to advertisements appearing in this issue of AIR CONDITIONING, HEATING AND VENTILATING, then fill out and mail the prepaid postcard to request further information.

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PUMPS FOR EVERY NEED. Page 22. The line of pumps manufactured by one company for boiler and other services, includes turbine pumps, condensate pumps, vertical pumps, and a duplex pump. The duplex pump consists of one cast iron receiver, two pumps, two motors, and complete float mechanisms. Bulletin with data on single and duplex pumps is available.....Item 271

INTEGRAL-FURNACE BOILERS. Page 85. Three boilers in a multi-unit installation produced 25,000 lbs of steam per hour each at 110 psi pressure for heat, hot water, and various processing operations for a bakery occupying 12 acres. The oil-fired boilers are available shop-assembled in standard sizes for loads ranging from 200 to 40,000 lbs per hour at steam pressures to 235 psi. A bulletin describing the boiler's features is available.....Item 272

GLASS FIBER DUST INSULATION. Page 4. This company marks its tenth year of glass fiber duct insulation service. The company manufactures thermal duct insulation to wrap air ducts with. The company also manufactures acoustical duct liners made of semi-rigid glass fiber insulation. .....Page 273

CABINET HEATERS. Pages 46-47. Seven different styles of cabinet heaters that look like a convector and have the high heating capacity of a unit heater are offered as a solution to the problem of heating lobbies, foyers, showrooms, supermarkets, small stores, and offices. The heaters can be floor-mounted, vertically-wall-mounted, recessed, or in concealed positions. They have a rubber mounted 2-speed motor, 18-gage steel fronts, and 20-gage tops, ends, and backs. The company also manufactures unit heaters and a full line of heating and cooling equipment. Bulletin available. .....Item 274

AUTOMATIC BOILER QUESTIONS. Page 66. The answers to questions about an automatic boiler include descriptions of its front and design that results in a guaranteed efficiency of over 80 per cent; its tube sheet design that results in uniform and rapid water circulation; and on the quality and simplicity of the boiler's construction. Facts about the boiler are available from two bulletins. .....Item 275

RANYAN ELECTRIC MOTORS. Page 63. These electric motors are built to NEMA standards with less weight and bulk and with lighter insulation. The motors have a one-piece stator frame, solid end plates that completely enclose the motor, and a base design that permits flexibility in installing or replacing.....Item 276

FURNACE DRAFT INDUCERS. Page 151. A furnace draft inducer and an inexpensive self stub stack to clear the roof make it unnecessary to paint steel stacks and brick chimneys periodically. The draft inducers are made with axial flow fans and an optional barometric damper. Bulletin available. .....Item 277

ELECTRIC GAS AND AIR HEATERS. Page 161. Electric heaters provide an economical solution to heating gases and process air. The heaters can produce temperatures up to 1000 deg. F and are maintained by a thermostat with manual or automatic control. Catalog with heating data available.....Item 278

HIGH PRESSURE SYSTEMS. Pages 18-19. High pressure air conditioning systems add more usable or rentable floor space, reduce floor-to-floor dimensions, and require fewer supplementary equipment rooms in multi-story office buildings, schools, hospitals, hotels, and institutions. The company's units include single and double duct wall and ceiling types for individual unit or zone control, and are capable of handling branch duct velocities up to 4000 ft per min. Bulletin on high pressure air distribution units available. .....Item 279

SINGLE EQUIPMENT SOURCE. Page 154. It is simpler to buy industrial and commercial burner equipment from a single source. This company manufactures automatic oil-burning and combination oil and gas-burning equipment and accessories which include rotary heavy oil burners, combination oil and gas burners, packaged pump and heater sets, and rotary burners for heavy oil, tar or pitch. Write for bulletins. .....Item 280

SCHOOL TEMPERATURE CONTROL. Pages 14-15. The heating, ventilating, the shower, and water heaters of two modern Texas schools are all regulated by this company's temperature controls. Each school has individual room control of heating and ventilating. The schools' domestic water heaters, swimming pool heaters, and boys and girls showers are also thermostatically controlled. Write for information .....Item 281

EXPANDED CONVECTOR LINE. Page 131. One convector manufacturer has expanded his line of convectors to include 20 types and 3000 sizes. The convectors are made in deluxe, standard, and institutional models; free-standing, fully and partially recessed, concealed and wall-hung types with many design variations. Details available. .....Item 282

MULTI-ROOM AIR CONDITIONING. Pages 54-55. Convector air conditioning units are being made in four new models, each in four sizes, for multi-room air conditioning. The smallest size occupies 2½ sq ft of floor area, is 9 in. deep, and 25 in. high. The four models made are a vertical cabinet model, a horizontal cabinet model, a horizontal concealed model, and a vertical concealed model. A bulletin is available. .....Item 283

TEMPERATURE CONTROLS. Page 68. This company manufactures steam temperature regulators, shower mixing valves, water controllers, and tempering valves for applications in factories, power plants, commercial buildings, processing plants, dairies, institutions, and ships. One type thermostatic regulator regulates the flow of liquid or steam through a valve, such as in a diesel engine. .....Item 284

GAS AND OIL BURNERS. Page 147. Gas and oil burners that will fire all types of boilers, warm air heating units, and Scotch marine boilers are designed to prevent firing at rated inputs without pulsation. The fuel and air changeover of the burner is automatic. The company also manufactures gas burners with forced mixing of fuel and air. Both type burners are available in 75,000 to 4.1-million Btu per hr capacities. Specification sheets available. .....Item 285

AIR CONDITIONING EQUIPMENT. Page 143. This company manufactures a selection of air conditioning equipment for complete installations. Among their products are water savers, blower units, sprayed coil dehumidifiers, heating and ventilating units, multi-zone units, indoor and outdoor cooling towers, liquid chillers, evaporative condensers, and finned coils. A catalog on each type of equipment is available. .....Item 286

EXHAUSTS WITHOUT BEND LOSS. Page 1. A direct-driven fan in a divided housing can exhaust corrosive fumes without a 90-deg bend loss. It can be mounted vertically, horizontally, or at angles, and is available in sizes from 1140 cfm to 450,000 cfm. The housings and fan wheels can be constructed of cold-rolled, stainless, or rubber covered steel. Bulletin and booklet with data and charts available.....Item 287

FLUSH VALVES. Page 11. This company's flush valves were selected on the basis of design and actual test files for installation in a $25-million shopping center that provides one-stop shopping for 40,000 people daily. A catalog is available from the company with 19 pages of valve installation details, over 75 blueprints, cut-away views, charts, formulas, and piping details, if requested on firm letterhead.....Item 288

COOLING TOWERS AND CONDENSERS. Page 31. Cooling towers in 2 to 120 ton capacities and water cooled condensers in 1/3 to 25 ton capacities are matched to work with each other. The wetted deck surfaces of the towers carry a 20-year guarantee against rotting or fungus attack. The condenser's tubes can be cleaned by a mechanical cleaning tool to restore heat transfer efficiency. Write for detail specifications on towers and condensers. .....Item 289

CLOSE-COUPLED PUMPS. Page 22. Some typical applications of these close-coupled pumps are on cooling towers, air conditioning, chilled water circulating, hot water circulating, pneumatic water systems, and booster systems. All of the pumps that are in stock are shipped the same day their order is received. The pumps are equipped with a leak-proof mechanical seal. Bulletin available. .....Item 290

SELF-CLEANING AIR FILTER. Page 49. An automatic, self-cleaning air filter is manufactured by one company for high efficiency, low resistance, to be non-clogging, and provide positive cleaning. A twelve-page bulletin about automatic air filtering is available from the company. .....Item 291

THIN CORE GRILLE. Page 148. This thin core grille is designed specifically for thin doors and partitions from ¼ to ⅝ in. thick. It is installed by clamping on to the door. It is available with or without frame, with gray or tan prime coat, or hammertone finish in gray or bronze. Catalog available listing over 1000 types and sizes of grilles. .....Item 292

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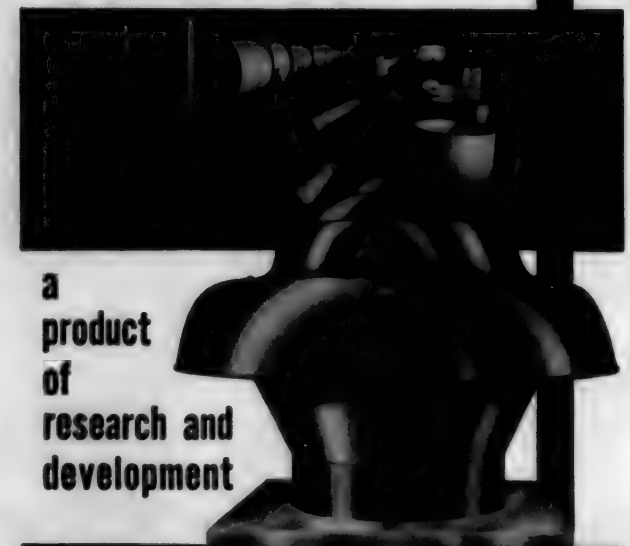

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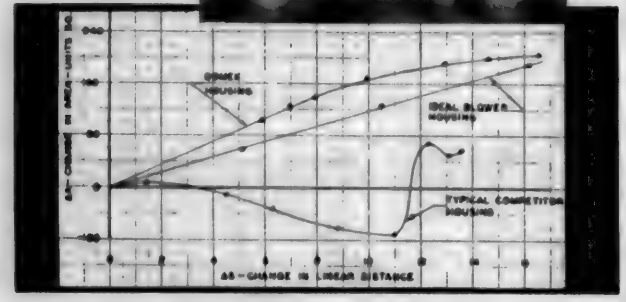

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City	March		Cumulative	
	1955	Normal	1954	Normal
Calgary, Alta.	1487	1215	7237	7881
Charlottetown, P. E. I.	1197	1203	6348	6869
Crescent Valley, B. C.	1218	961	6611	6704
Edmonton, Alta.	1538	1290	7906	8589
Fort William, Ont.	1577	1386	8621	8590
Grande Prairie, Alta.	1655	1339	8557	8795
Halifax, N. S.	1035	1066	5462	6134
London, Ont.	1042	1073	6189	6326
Medicine Hat, Alta.	1420	1150	7066	7588
Moncton, N. B.	1222	1190	6670	7296
Montreal, P. Q.	1234	1265	7118	7373
North Bay, Ont.	1404	1280	8119	7933
Ottawa, Ont.	1271	1256	7422	7638
Penticton, B. C.	1004	787	5613	5566
Porquis Junction, Ont.	1668	1550	9466	9614
Prince George, B. C.	1476	1091	7533	7768
Quebec City, P. Q.	1358	1311	7702	7999
Regina, Sask.	1742	1504	8765	9641
St. John, N. B.	1180	1132	6551	6784
Saskatoon, Sask.	1810	1445	8864	9356
Toronto, Ont.	1016	1072	5680	6226
Vancouver, B. C.	827	682	4415	4479
Victoria, B. C.	819	651	4282	4065
Windsor, Ont.	930	995	5506	5872
Winnipeg, Man.	1782	1531	9067	9622

*These data are supplied through the courtesy of the Meteorological Division Air Service Branch, Department of Transport, Canada.

COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available

AUTOMATION SYMPOSIUM—Engineering symposium on Automation—Engineering for Tomorrow to be presented by The College of Engineering, Michigan State College, as part of their Centennial Year celebration, to be held at the College. P. J. Thorson, assistant professor of mechanical engineering, Michigan State College, East Lansing, Mich. .....**MAY 12-14, 1955.**

AIR POLLUTION MEETING—48th annual meeting of the Air Pollution Control Association, in Detroit, Mich. Harry C. Ballman, executive secretary of the Association, 4400 Fifth Ave., Pittsburgh 13, Pa. .....**MAY 22-26, 1955.**

NDHA MEETING— 46th annual meeting of the National District Heating Association, at the Edgewater Beach Hotel, Chicago, Ill. John F. Collins, Jr., secretary of the Association, 827 N. Euclid Ave., Pittsburgh 6, Pa. .....**MAY 23-25, 1955.**

OHI CONFERENCE—First annual OHI Commercial-Industrial Oil Burning & Equipment Conference, to be held at Kellogg Center, Michigan State College, East Lansing, Mich. R. H. Becker, managing director of Oil-Heat Institute of America, 500 Fifth Ave., New York 36, N. Y. ....**MAY 23-25, 1955.**

HEATING AND AIR CONDITIONING SHORT COURSE—Hot Water Steam Heating and Air Conditioning Short Course, at Purdue University, sponsored by The Institute of Boiler and Radiator Manufacturers. Merle M. McClure, assistant director, Division of Adult Education, Purdue University, West Lafayette, Ind. .....**MAY 23-25, 1955.**

NAPC EXPOSITION—Annual convention and exposition of the National Association of Plumbing Contractors, Inc., to be held at Navy Pier, Chicago, Ill. W. F. Clucas, executive secretary of the Association, 1016 20th, N. W., Washington, D. C. .....**JUNE 6-9, 1955.**

WELDING SOCIETY SHOW—3rd annual show of the American Welding Society at Municipal Auditorium, Kansas City, Mo., to be held in conjunction with the Society's annual spring technical meeting. Joseph G. Magrath, national secretary of the Society, 33 W. 39th St., New York 18, N. Y. .....**JUNE 7-10, 1955.**

OIL HEAT EXPOSITION—1955 Eastern Biennial Exposition of Oil Heat and Domestic Cooling, at the Hotel Statler, Boston, Mass., sponsored by Oil Heat Institute of New England. Fred N. Beckwith, exposition manager, 839 Beacon St., Boston 15, Mass. .....**JUNE 7-10, 1955.**

(Concluded on page 162)

CHROMALOX *Electric* **HEATERS**

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For Accurate Temperatures Up to 1000° F Maintained by Thermostat with Manual or Automatic Control

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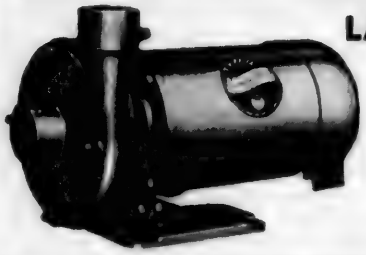

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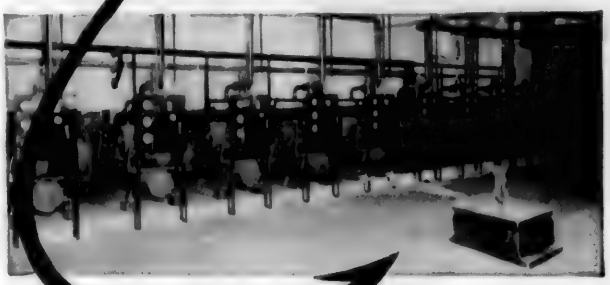

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Solution: Korfund steel spring isolators and Elasto-Rib pads completely prevented vibration and noise transmission, eliminated all bolting to the floor, and made economical light-weight floor construction possible.

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80% Power Factor—12.1 MFD capacitor.

Write today for complete specifications.

The Standard of Dependability

Redmond COMPANY, INC.
OWOSSO, MICHIGAN

THE BIG NAME IN SMALL MOTORS

(*Concluded from page* 160)

ASRE SPRING MEETING—Spring meeting of the American Society of Refrigerating Engineers, at the Hotel Schroeder, Milwaukee, Wis. R. C. Cross, secretary of the Society, 234 Fifth Ave., New York 1, N. Y. . . . . **JUNE 12-15, 1955.**

REFRIGERATION CONVENTION—Annual convention of the Air Conditioning and Refrigeration Institute, at The Homestead, Hot Springs, Va. G. S. Jones, Jr., executive secretary of the Institute, 1346 Connecticut Ave., N. W., Washington 6, D.C. . . . . **JUNE 12-15, 1955.**

AUTOMOTIVE ENGINEERS MEETING—SAE Golden Anniversary summer meeting of the Society of Automotive Engineers, at the Chalfonte-Haddon Hall, Atlantic City, N. J. Secretary of the Society, 29 W. 39th St., New York 18, N. Y. . . . . **JUNE 12-17, 1955.**

TESTING MATERIALS MEETING—Annual meeting of the American Society for Testing Materials, at the Chalfonte-Haddon Hall, Atlantic City, N. J. Secretary of the Society, 1916 Race St., Philadelphia, Pa. . . . . **JUNE 26-JULY 1, 1955.**

ASHAE MEETING—The semi-annual meeting of the American Society of Heating and Air-Conditioning Engineers in San Francisco, Calif. A. V. Hutchinson, executive secretary of the Society, 62 Worth St., New York 13, N. Y. . . . . **JUNE 27-29, 1955.**

INTERNATIONAL CONGRESS OF REFRIGERATION—Ninth International Congress of Refrigeration, sponsored by the International Institute of Refrigeration, to be held in the conference rooms of the Sorbonne in Paris, France. General Secretariat of the Congress, International Institute of Refrigeration, 177, Boulevard Malesherbes, Paris, France . . . . . **AUGUST 31-SEPTEMBER 15, 1955.**

INSTRUMENT SOCIETY CONFERENCE—Tenth Annual Conference and Exhibit of the Instrument Society of America, to be held at Shrine Exposition Hall and Shrine Auditorium, Los Angeles, Calif. John McCaffery, assistant executive secretary of the Society, 1319 Allegheny Ave., Pittsburgh 33, Pa. . . . . **SEPTEMBER 12-16, 1955.**

GAMA MEETING—Annual meeting of the Gas Appliance Manufacturers Association, at the El Mirador, Palm Spirngs, Calif. H. Leigh Whitelaw, managing director of the Association, 60 E. 42nd St., New York,. N. Y. . . . . **OCTOBER 12-14, 1955.**

AGA CONVENTION—1955 convention of the American Gas Association and the Pacific Coast Gas Association, at the Statler Hotel, Los Angeles, Calif. Secretary of the AGA, 420 Lexington Ave., New York 17, N. Y. . . . . **OCTOBER 17-19, 1955.**

ASA MEETING—Annual meeting of the American Standards Association, at the Sheraton Park Hotel, Washington, D.C. Secretary of the Association, 70 E. 45th St., New York 17, N. Y. . . . . **OCTOBER 24-26, 1955.**

SOLAR ENERGY SYMPOSIUM—A World Symposium on Applied Solar Energy, sponsored by Stanford Research Institute, Stanford, Calif., to be held at Phoenix, Ariz. Chairman of the Institute, 612 S. Flower St., Room 332, Los Angeles 14, Calif. . . . . **NOVEMBER 2-5, 1955.**

POWER EXPOSITION—Chicago Exposition of Power & Mechanical Engineering, at the Coliseum, Chicago, Ill., to be held under the auspices of The American Society of Mechanical Engineers, in conjunction with their 75th Anniversary meeting. E. K. Stevens, manager, International Exposition Co., Inc., 480 Lexington Ave., New York, N. Y. . . . . **NOVEMBER 14-18, 1955.**

ASRE WINTER MEETING—Winter meeting of the American Society of Refrigerating Engineers, at the Hotel Statler, New York, N. Y. R. C. Cross, secretary of the Society, 234 Fifth Ave., New York 1, N. Y. . . . . **NOVEMBER 27-30, 1955.**

CHEMICAL ENGINEERS MEETING—Annual meeting of American Institute of Chemical Engineering, at the Statler Hotel, Detroit, Mich. Secretary of the Intsitute, 29 W. 39th St., New York 18, N. Y. . . . . **NOVEMBER 27-30,1955.**

REFRIGERATION EXPOSITION—9th Exposition of the Air-Conditioning and Refrigeration Industry, at Atlantic City, N. J., sponsored by the Air-Conditioning and Refrigeration Institute. The name of this trade show, formerly known as the All-Industry Refrigeration and Air Conditioning Exposition, has been officially changed. George Jones, executive secretary of the Institute, 1346 Connecticut Ave., N. W., Washington, D. C. . . . . **NOVEMBER 28—DECEMBER 1, 1955.**

CHEMICAL INDUSTRIES EXPOSITION—25th exposition of Chemical Industries, at Commercial Museum and Convention Hall, Philadelphia, Pa. E. K. Stevens, manager, International Exposition Co., 480 Lexington Ave., New York 17, N. Y. . . . . **DECEMBER 5-9, 1955.**

NUCLEAR CONGRESS—Nuclear Congress and Atomic Exposition, sponsored by the Engineers Joint Council, to be held in Cleveland, Ohio. Stewart E. Reimel, secretary of the Council, 29 W. 39th St., New York 18, N. Y. **DECEMBER 12-17, 1955.**

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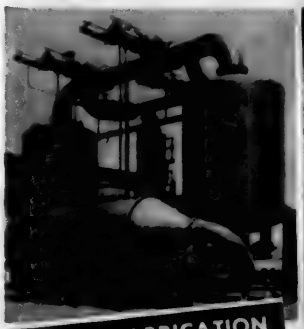

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Cold reception rooms, lobbies, vestibules, entrances are poor invitations to patrons of banks, hotels, stores, restaurants or similar commercial establishments. Owners will never know how much business they lose as a result. But the cost of a Carrier Cabinet Unit Heater is so little in comparison that the installation becomes a matter of good business.

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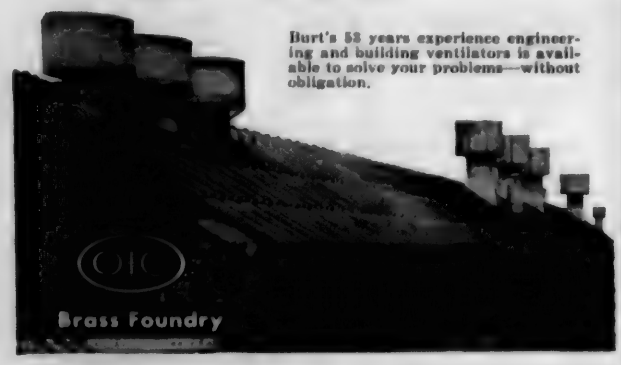
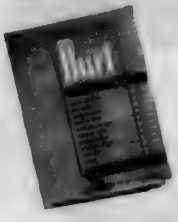
BURT VENTILATORS SOLVE LOCATION AND PRODUCTION PROBLEMS FOR OIC VALVES

The Ohio Injector Company, Wadsworth, Ohio—one of the nation's largest manufacturers of industrial valves—had two problems. Their plants are in a valley with almost no natural air movement. Their busy foundries create high heat, fumes and dust. Burt Ventilators solved both. Fifteen 30" Burt Free-Flow Ventilators on their Iron and Bronze Foundry and eleven 36" units on their Brass Foundry change the air every 3½ minutes. In other buildings, carefully spaced 60" Burt Free Exhaust Fan Ventilators provide fast, volume exhaust, changing the air every 4½ to 5 minutes. Workmen praise the system. Production has improved materially.



Burt's 53 years experience engineering and building ventilators is available to solve your problems—without obligation.



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ELLISON AIR FILTER GAGES IN 3 TYPES

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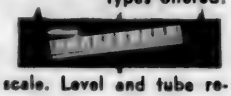

Accurately indicates air flow resistance in duct at air filter. Easy-read white enamel scale. Level and tube replaceable on the job. Easily installed.

Diafram Actuated, Dial Type

High powered, free floating diafram. Accurate pointer mechanism floats on knift-edge bearings. Easy to read—readily installed.

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Bell submersed in oil pan actuates the accurate mechanism which floats on knife-edge bearings. Bell oil easily replenished through inlet at top.

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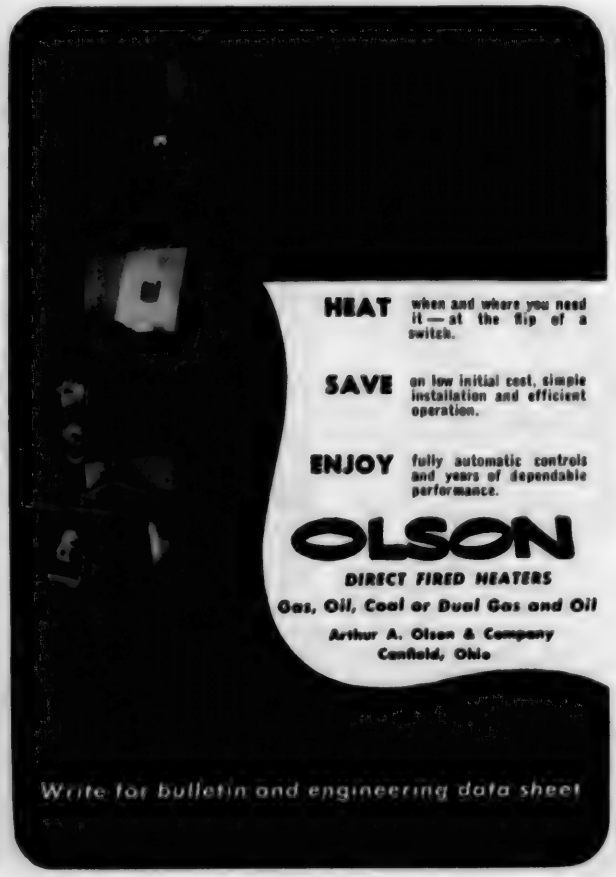
The Ellison Line Also Includes:

Draft Gages, Bell and Diafram—Inclined Draft Gages—Portable Inclined Vertical Tube Gages—Vertical Tube Gages—Oil, Heavy Liquid and Mercury—Single and Multi-Tube-Saturator Gages—U Gages—Stationary and Portable—Air Filter Gages—Dial and Inclined Tube Types—Pitot Tubes—U Path Steam Calorimeters—Portable Gas Analyzers-Orsat Type



HEAT when and where you need it—at the flip of a switch.

SAVE on low initial cost, simple installation and efficient operation.

ENJOY fully automatic controls and years of dependable performance.

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DIRECT FIRED HEATERS

Gas, Oil, Coal or Dual Gas and Oil

Arthur A. Olson & Company

Canfield, Ohio

Write for bulletin and engineering data sheet

HARD COAL

(*Continued from* page 148)

automatic anthracite heating." New automatic hard coal burners utilize the small inexpensive coal sizes which are estimated as the lowest cost domestic fuel in most areas of the Northeastern states.

• **SUBSIDY.**—Mr. Decker also pointed out that a new plan instituted by hard coal producing companies is having a decided effect on the home heating market. Through a subsidy on equipment sales, dealers are now able to sell automatic anthracite equipment at a price competitive to other low cost automatic fuel burning units.

• **DISPLAY.**—To show these units to homeowners throughout the Northeastern seaboard, the industry previewed for the press and fuel dealers attending the convention, a spectacular mobile equipment display, called the Anthracade. This mammoth trailer-tractor, carries on its deck various types of equipment in motion and under actual fire. Ramps on both sides provide access for visitors to walk into and inspect the vehicle which will go on tour of communities in the Northeastern area. It will act as a combined new equipment display and free fuels clinic for local homeowners and building operators.

INDUSTRIAL REACTOR

to be constructed in Chicago to further private research of participating industries.

One of the first nuclear reactors established specifically for private industrial research will be built in Chicago this year.

The Armour Research Foundation of Illinois Institute of Technology announced that the $500,000 reactor will be built on the institute's South Side campus by North American Aviation, Inc. Mid-western industry will join the foundation in financing the cost of the project.

The uranium fuel for the reactor will be obtained from the Atomic Energy Commission on an "extended loan" basis. The A. E. C. has given its tentative blessing to the project, but is holding up final approval until it passes on design, building plans, schedule of operation and health safeguards.

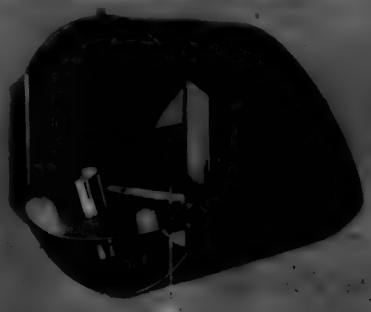
• **WATER BOILER.**—The reactor, known as the aqueous homogeneous or "water boiler" type, uses as fuel one kilogram of uranium 235 in a water solution. This solution will be contained in a steel sphere a foot in diameter and act as the core of the reactor. The reactor will be capable of operating at a power level of 50,000 watts.

The reactor will produce neutrons and gamma radiation for research and development in the fields of biology, metallurgy, food processing, electronics, chemistry, textiles, oils and gases, rubber and leather, machinery, building materials and allied industrial and scientific pursuits. Radioisotopes that lose their energy in a few hours also will be made available to industries participating.

(*Continued on page* 166)

For commercial & industrial heating with

GAS



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Now you can eliminate heavy fuel wastes with complete safety. With four years of perfect performance behind it the Field "MG" now carries the recommendation of leading gas companies across the country—fully safe, absolutely dependable, highly efficient. But be sure the control you install is a Field. In a gas installation only a perfect control is a good control.

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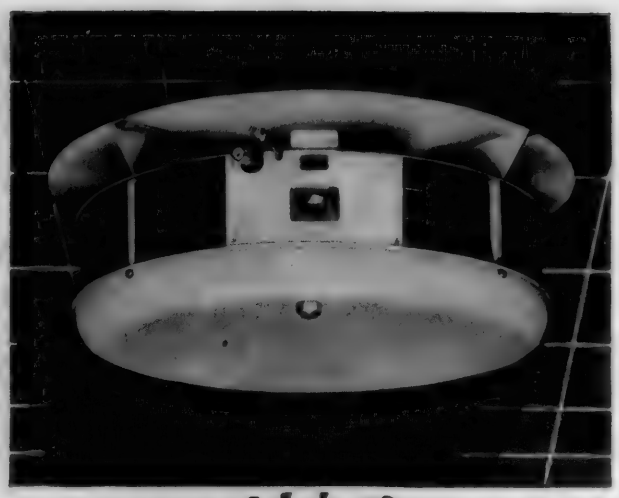

DOERR Motors
solve problem
on Bush
Jet Coolers

Ceiling Jet Unit Coolers, a product of the Bush Manufacturing Company, of West Hartford, Connecticut, have the responsible job of maintaining continuous low temperatures in cold storage rooms. This calls for reliable motor operation, usually in the presence of high humidity.

The Doerr 1/10 hp, 1140 rpm, Type C, permanent split capacitor motor selected had to be suitable for replacement in existing units in the field. The band mounting used restricts the frame diameter and height is also at a premium. The unusual method shown for mounting the capacitor provided the answer and has simplified assembly in both production and in servicing.

This is another instance where Doerr has helped with a special design. If you have an unusual motor problem, please let us hear from you.

YOU GET **MORE** with DOERR!

Electric Motors from 1/30 to 5 hp. Standard or designed to your specifications.

DOERR
Electric Corporation
CEDARBURG, WISCONSIN

INDUSTRIAL REACTOR

(*Continued from page* 165)

Being a private project, no secrecy of any kind will be called for, other than that required for protection of individual sponsor programs.

Construction started in mid-March, with completion scheduled for the end of the year.

• **PRIVATE.**—Thus far there is only one private reactor not devoted to A. E. C. work—a 10,000-watt atomic pile at North Carolina State College. Plans were announced in New York in February for construction of the country's first nuclear reactor entirely owned and operated by private industry for the New York metropolitan area.

Invitations to join the project were sent to ten large companies in the fields of electronics, petroleum, food, pharmaceutical and chemical products, rubber, ceramics, metals, textiles, agriculture, machinery and others. Cost was estimated at between $1,000,000 and $1,500,000.

REACTOR COMPONENTS

to be made in first privately financed plant for manufacture of fuel and core elements.

Plans for the construction of what is believed to be the first privately financed major plant for the manufacture of fuel elements and other reactor core components for the nuclear power industry, were announced in March by the Atomic Energy Division of The Babcock & Wilcox Company. The plant, to be located about 5 miles east of Lynchburg, Va., is expected to be completed by the end of the year.

The proposed site of approximately 500 acres bordering the James River has been selected in accordance with regulations used by the Atomic Energy Commission in selection of government sites. The plant will be a one-story structure of approximately 100,000 square feet, and will house various laboratories and offices as well as the complex manufacturing equipment.

• **QUALIFIED.**—B&W announced last year that it anticipates making complete nuclear steam generators for the production of electric power. The company has already developed and fabricated special equipment for many of the major atomic energy installations. The new plant will provide properly designed facilities for the manufacture of many types of special equipment for this rapidly growing industry.

The company designed and built vital equipment for the Nautilus, the world's first atomic submarine, and will also furnish much of the equipment used to power the second atomic sub, the USS Sea Wolf. In addition, B&W is supplying much equipment for large scale nuclear tests in the national laboratories and has developed and placed on the market three low-cost reactors which can be used by colleges and other organizations for research and training purposes.

WAR ON SMOG

enlists aid of electronic computers to analyze data, symposium hears.

Smog is becoming a nation-wide and international problem. Its exact causes are still not precisely analyzed. But electronic computing machines may help fathom the mystery.

These were some of the ideas advanced as 375 scientists and engineers met in Pasadena, Cal., for the third National Air Pollution Symposium.

• **PLANT DAMAGE.**—Dr. Frits Went, a plant physiologist, reported that smog damage to plants had been observed not only around Los Angeles, the nation's most smog-hit city, but also near New York, Baltimore, Philadelphia, San Francisco, London, Paris, Algiers, Copenhagen, Denmark; Sao Paulo, Brazil and Bogota, Columbia.

He said that typical damage was the stunting of plants' growth and "silvering" of the underside of leaves. Around Los Angeles, crop damage running into hundreds of thousands of dollars has been reported. The damage has been traced to oxidized hydrocarbons. Their exact source is not known, but similar effects can be produced in laboratory experiments with gasoline.

• **SPONSORS.**—The symposium is a three-day meeting. It is sponsored by the Stanford Research Institute, in cooperation with the Air Pollution Control Association, a national body; the California Institute of Technology, the University of California at Lo- Angeles, the University of Southern California and the Air Pollution Foundation of Los Angeles.

Any inference that automobiles are the main cause of smog is quite unwarranted, other symposium speakers made clear.

Dr. Lauren Hitchcock, head of the Air Pollution Foundation, reported that extensive research had shown that the plant-damaging properties of smog are quite distinct from its eye-irritating and visibility-reducing properties.

• **SOURCES.**—The current consensus of smog researchers is that in Los Angeles it comes partly from automobiles, partly from backyard incinerators and partly from industries.

(*Continued on next page*)

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Formerly Manufactured By
PARKER-KALON Now
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We're in full production on the famous Dial Damper Regulators, plus the many other former Parker-Kalon products for the Heating, Air Conditioning and Metal Working industries.

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Complete catalog fully describes Duro-Metal-Fab and Dial Regulators, as well as the extensive line of other Duro-Dyne products—including those formerly manufactured by Parker-Kalon. Products are available at your P-K—Duro-Dyne distributor.

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Flexible Duct Connector Material.

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COOLING TOWER NEWS

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The two towers illustrated above are on the roof of a large industrial plant. The one on the right cools 4000 gals. of quench water per minute. The other cools 2850 gals. of water a minute for electrical heat treating equipment. The air intakes on this tower are equipped with filters to trap all dirt and dust and to keep the cooling water clean.

The towers shown to the right are used in the air conditioning systems of two large commercial buildings. The one tower had no space restrictions, the other was very limited...But Binks Engineers met both conditions with a tower that assures excellent cooling, long trouble-free service and definite economies.

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WAR ON SMOG

(*Continued from page* 167)

But the pollutants from these sources do not become smog until they have gone through chemical reactions in the air.

"It is entirely possible," Dr. Hitchcock said, "that certain pollutants have importance as smog-formers out of all proportion to the quantity of the sources in which they occur, or to their concentrations."

More than 100,000 quantitative and qualitative measurements of Los Angeles atmosphere made during last fall's four-month smog season have been put on computing machine punch cards and are still being analyzed, Dr. Hitchcock said.

• **AUTOS.**—The automobile industry is doubling its research on exhaust fumes and their elimination. The outlay of about $500,000 last year will be increased to $1,000,000 this year. This was reported by James C. Zeder, engineering vice president of the Chrysler Corporation.

The research program is directed both at improving auto engine combustion and rendering unburned gases innocuous.

A simple spring-and-valve gadget being tested on his own car, he said, showed promise of eliminating from 75 to 90 per cent of fuel unburned during deceleration.

The auto industry gave the Air Pollution Foundation $100,000 toward its current $750,000 budget on smog research. The foundation, a private agency, has been working with the Los Angeles County Air Pollution Control authority.

POWER CONFERENCE

hears engineers and experts make predictions and sound warnings of the future.

The electric utility industry must prepare for a billion-dollar annual increase in household electricity business within 10 years. That warning was issued March 30 by John W. Evers, president of the Commonwealth Edison company, at the 17th annual American Power conference, sponsored by Illinois Institute of Technology, at the Sherman hotel in Chicago. He based his prediction on figures used by President Eisenhower

POWER CONFERENCE

(*Continued from page* 168)

in his recent economic message.

The problems involved in increased use of electricity—which will run the entire gamut of utility operations—will be made more acute by the shortage of trained engineers, Mr. Evers declared. The electric utility industry also faces an education problem, he added, for architects, builders, and owners of homes must be made to realize that it costs so little more to wire not only for the present but also for the future.

• **FUTURE.**—Commenting on future predictions by leaders in the industry, Mr. Evers called some of the things they say a bit fantastic. But he added that recent experiences of Commonwealth Edison in two areas—nuclear power and automation—indicate there is more truth than fantasy in these predictions. He labeled as not unlikely the prospect that a nuclear power plant will be a part of this country's economic future by 1965.

We are reasonably certain, Mr. Evers said, that some day nuclear power will compete economically with our conventional plants. We look forward to economic nuclear power as a favorable prospect for both Commonwealth Edison and the electric industry at large.

• **SEA WATER CONVERSION.**— Conversion of sea water to fresh water at reasonable cost appears in sight. David S. Jenkins, director of the Department of the Interior saline water conversion program, told engineers at the American Power conference. Conversion studies have shown very promising results. Field testing of one conversion process is in progress and two or three other processes will be far enough advanced by next year to warrant field testing.

Conservation methods alone will not be sufficient to end the world's growing water shortage, Mr. Jenkins asserted. The obvious answer to the problem, he said, is to obtain the water from the sea. The oceans constitute three-fourths of the surface of the earth and afford an inexhaustible source of water. He stressed, however, that the high cost of conversion still is the main roadblock in large-scale conversion plans. But encouraging results

(*Continued on next page*)

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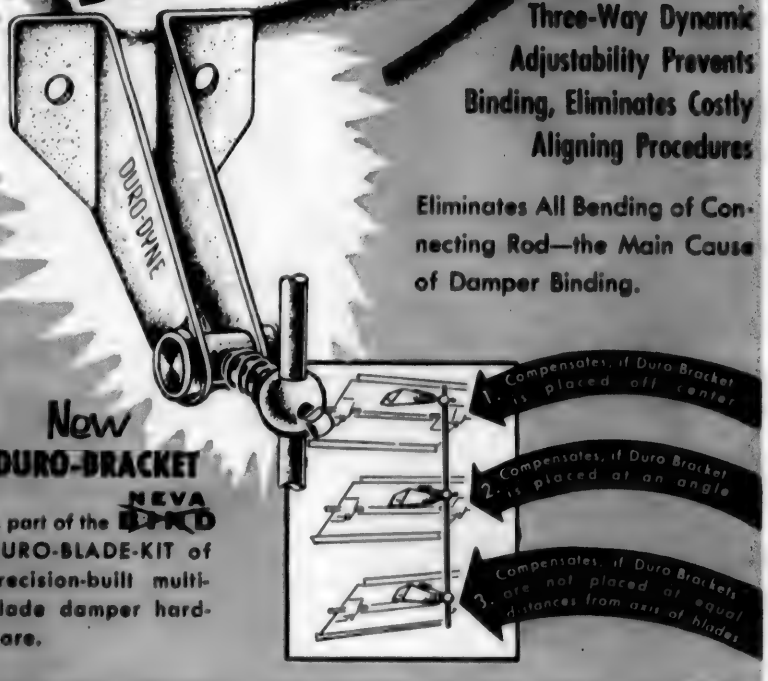
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POWER CONFERENCE

(*Continued from page* 169)

are being obtained and it now appears that in time conversion of both brackish and sea water will be feasible, he declared. He stated that 24 research and development contracts have been let, and that several have been completed with promising results.

The acute need for converted water was emphasized by Mr. Jenkins, saying that in certain areas of the United States ground water is being withdrawn at 30 times the rate of replenishment and ground water pumping has caused intrusion of salt water from the sea both on the Atlantic and Pacific seaboard.

• **PUBLIC VS. PRIVATE**—Socialization of the power industry is inevitable unless the nation's public power policy is changed, a private utility executive warned. The charge was made by Alexander M. Beebee, president of the Rochester (N. Y.) Gas and Electric Corp., at the American Power Conference. He called for a halt to the government's "discrimination and subsidization" power policy which "benefits a few at the expense of many."

Principles underlying public power programs have outlived their usefulness and no longer serve the public interest, Mr. Beebee asserted. As we see it, he explained, either the whole power industry of the country should be allowed to avoid taxes and interest, or they all should carry their fair share of these burdens.

Mr. Beebee said private utilities are not seeking special privilege, but rather equality of opportunity and equality of taxation. From 40 to 50% of the private electric utility revenue goes to pay taxes and interest on plant investment. While the avoidance of taxes and interest may help a particular area, he said the "drowning" effect on the rest of the country must be considered. He pointed out that those who benefit from public power developments constitute only about 12% of the population.

• **ATOMIC POWER.**—The United States will have a nuclear power capacity equal to its present total power capacity by 1977. it was predicted at the conference by W. Kenneth Davis, director of the AEC division of reactor development. Having a capacity of 100 million kilowatts, the nuclear

plants probably will represent an investment of nearly $20 billion.

He cautioned, however, that we are still some distance from being able to show even on paper that we can build an economic nuclear power plant. The important point is that government and industry are firm in the belief that economic power plants can and will be built, he stressed.

Mr. Davis foresees three phases in the transition from conventional to nuclear power plants in the United States. After an induction phase in which it is anticipated some fairly large nuclear plants will be built, largely with private funds, an era of fast expansion will follow in which the growth of the industry will snowball, Mr. Davis predicted. When the expansion point is reached. he said, it is not difficult to foresee the proportion of nuclear power plants to the total being built increasing from perhaps 5% to 60% in 10 years or less.

The final phase in the development, he added, would be a period of slow saturation when the proportion of new nuclear plants reaches "perhaps 60 or 70%."

The AEC official stressed the necessity of getting private industry into nuclear power development on an incentive rather than a cost-plus basis.

(In cost-plus contracts, industry is reimbursed for all costs in a project and gets other predetermined returns but does not gain full rights to the completed project.)

"Though there is no 'law of nature' which says that nuclear power must be cheaper than conventional power, I believe that nuclear power can compete with and even be produced at lower cost than power from conventional fuels if its development is carried out on a sound basis," Mr. Davis said. He added, however, that under cost-plus contracts we will never have the incentive that leads to the ingenuity and initiative required to get the costs down to a competitive level.

Nuclear power expansion in this country will depend upon the calculated risks of individual producers, Mr. Davis declared; that is, the number of individual producers who decide that the construction and operation of nuclear power plants offer long-range advantages which outweigh the disadvantages.

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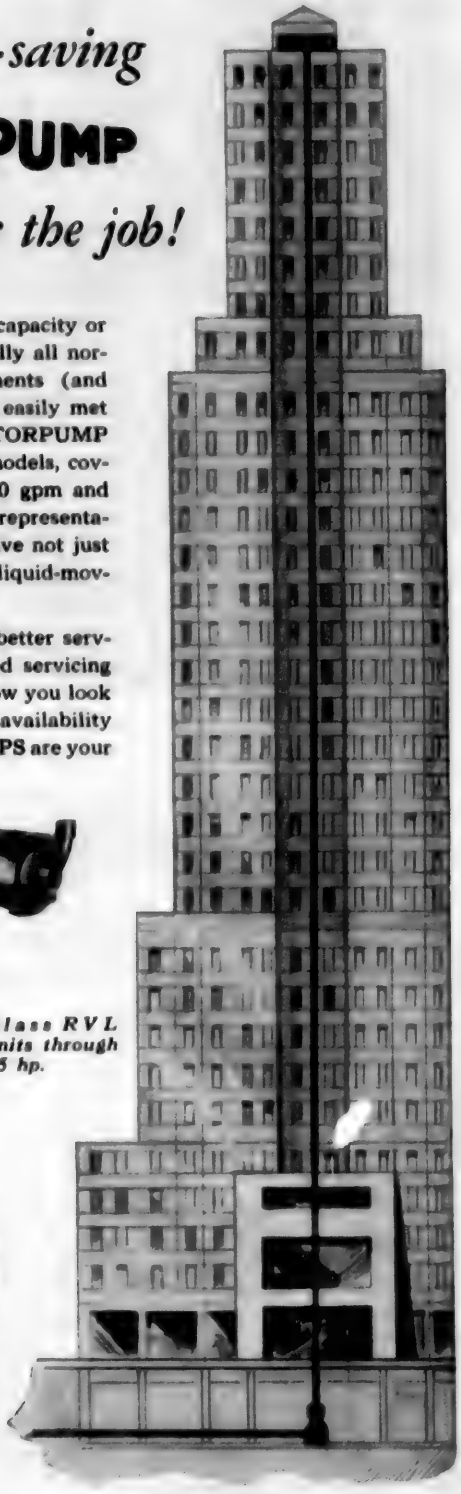

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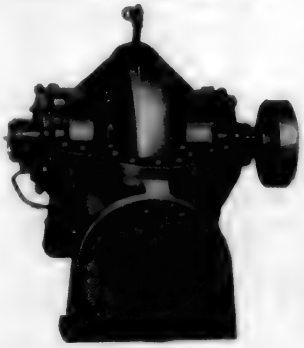

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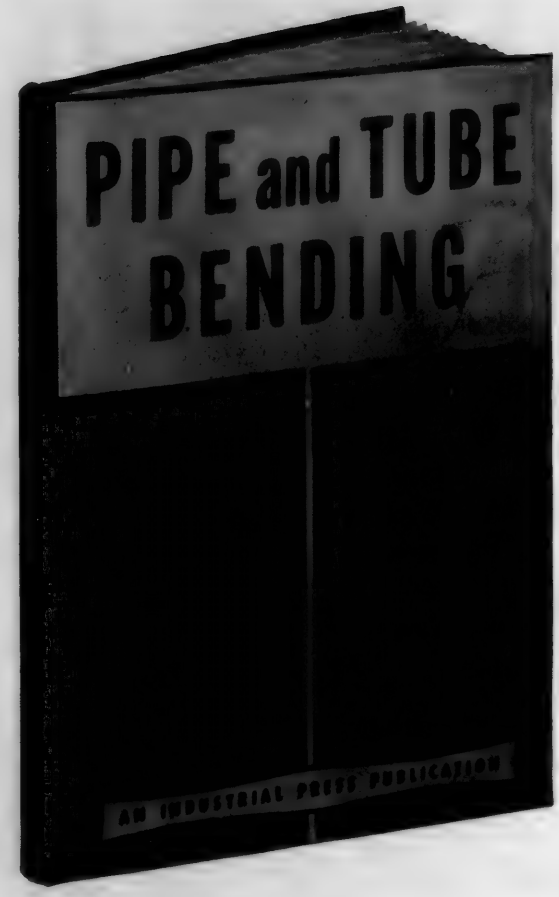

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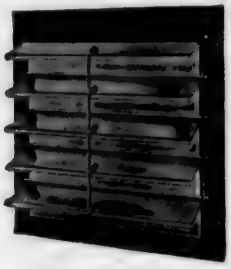

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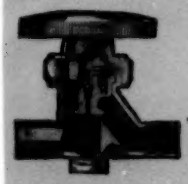
Dry Bulb Temp., °F	Wet-Bulb Temperature, °F									
	50	51	52	53	54	55	56	57	58	59
	Relative Humidity, Per-Cent									
76	9.0	11.7	14.5	17.3	20.2	23.1	26.1	29.1	32.2	35.4
77	7.6	10.2	12.9	15.6	18.3	21.2	24.1	27.0	30.0	33.0
78	6.2	8.7	11.3	14.0	16.6	19.4	22.2	25.0	27.9	30.9
79	4.9	7.4	9.9	12.4	15.0	17.7	20.4	23.1	25.9	28.8
80	3.7	6.1	8.5	11.0	13.5	16.0	18.7	21.3	24.0	26.8
81	2.6	4.9	7.2	9.6	12.0	14.5	17.0	19.6	22.2	24.9
82		3.7	6.0	8.3	10.7	13.1	15.5	18.0	20.6	23.1
83			4.9	7.1	9.4	11.7	14.1	16.5	18.9	21.5
84			3.8	6.0	8.2	10.4	12.7	15.1	17.4	19.9
85			2.8	4.9	7.0	9.2	11.4	13.7	16.0	18.4
86				3.9	5.9	8.0	10.2	12.4	14.6	16.9
87				2.9	4.9	7.0	9.0	11.2	13.3	15.5
88					3.9	5.9	7.9	10.0	12.1	14.2
89					3.0	5.0	6.9	8.9	10.9	13.0
90					2.2	4.0	5.9	7.9	9.8	11.9
91						3.2	5.0	6.9	8.8	10.7
92						2.4	4.2	6.0	7.8	9.7
93							3.3	5.1	6.9	8.7
94							2.6	4.3	6.0	7.8
95							1.8	3.5	5.2	6.9
96								2.8	4.4	6.1
97								2.1	3.6	5.3
98									2.9	4.5
99									2.3	3.8
100									1.7	3.1
101										2.5
102										1.9
103										1.3

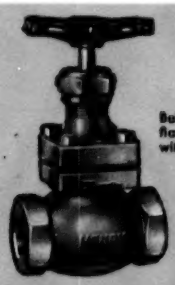
Dry Bulb Temp., °F	Wet-Bulb Temperature, °F									
	60	61	62	63	64	65	66	67	68	69
	Relative Humidity, Per-Cent									
60	100.0									
61	94.5	100.0								
62	89.3	94.6	100.0							
63	84.3	89.5	94.7	100.0						
64	79.6	84.6	89.6	94.8	100.0					
65	75.2	80.0	84.8	89.8	94.8	100.0				
66	70.9	75.5	80.2	85.0	89.9	94.9	100.0			
67	66.9	71.4	75.9	80.5	85.3	90.1	95.0	100.0		
68	63.1	67.4	71.8	76.2	80.8	85.5	90.2	95.0	100.0	
69	59.4	63.6	67.8	72.1	76.6	81.1	85.6	90.3	95.1	100.0
70	56.0	60.0	64.1	68.3	72.5	76.9	81.3	85.9	90.5	95.2
71	52.7	56.6	60.5	64.6	68.7	72.9	77.2	81.6	86.0	90.6
72	49.6	53.3	57.1	61.1	65.0	69.1	73.3	77.5	81.8	86.2
73	46.6	50.2	53.9	57.7	61.6	65.5	69.5	73.6	77.8	82.0
74	43.8	47.3	50.9	54.5	58.3	62.1	65.9	69.9	73.9	78.1
75	41.1	44.5	48.0	51.5	55.1	58.8	62.5	66.3	70.3	74.3
76	38.6	41.9	45.2	48.6	52.1	55.7	59.3	63.0	66.8	70.6
77	36.2	39.3	42.6	45.9	49.3	52.7	56.2	59.8	63.4	67.2
78	33.9	36.9	40.1	43.3	46.5	49.9	53.3	56.7	60.3	63.9
79	31.7	34.7	37.7	40.8	43.9	47.2	50.5	53.8	57.2	60.7

Dry Bulb Temp., °F	Wet-Bulb Temperature, °F									
	60	61	62	63	64	65	66	67	68	69
	Relative Humidity, Per-Cent									
80	29.6	32.5	35.4	38.4	41.5	44.6	47.8	51.0	54.3	57.7
81	27.7	30.4	33.3	36.2	39.1	42.2	45.2	48.4	51.6	54.9
82	25.8	28.5	31.2	34.0	36.9	39.8	42.9	45.9	49.0	52.1
83	24.0	26.6	29.3	32.0	34.8	37.6	40.5	43.4	46.5	49.5
84	22.3	24.9	27.4	30.1	32.8	35.5	38.3	41.2	44.1	47.0
85	20.7	23.2	25.7	28.2	30.9	33.5	36.2	39.0	41.8	44.7
86	19.2	21.6	24.0	26.5	29.0	31.6	34.2	36.9	39.6	42.4
87	17.8	20.1	22.4	24.8	27.3	29.8	32.3	34.9	37.5	40.2
88	16.4	18.6	20.9	23.2	25.6	28.0	30.5	33.0	35.6	38.2
89	15.1	17.3	19.5	21.7	24.0	26.4	28.7	31.2	33.7	36.2
90	13.9	16.0	18.1	20.3	22.5	24.8	27.1	29.4	31.9	34.3
91	12.7	14.8	16.8	18.9	21.1	23.3	25.5	27.8	30.1	32.5
92	11.6	13.6	15.6	17.7	19.7	21.9	24.0	26.2	28.5	30.8
93	10.6	12.5	14.4	16.4	18.4	20.5	22.6	24.7	26.9	29.2
94	9.6	11.4	13.3	15.2	17.2	19.2	21.2	23.3	25.5	27.6
95	8.6	10.4	12.3	14.1	16.0	18.0	20.0	22.0	24.0	26.1
96	7.8	9.5	11.3	13.1	14.9	16.8	18.7	20.7	22.7	24.7
97	6.9	8.6	10.3	12.1	13.9	15.7	17.6	19.5	21.4	23.4
98	6.1	7.7	9.4	11.1	12.9	14.6	16.4	18.3	20.2	22.1
99	5.4	6.9	8.6	10.2	11.9	13.6	15.4	17.2	19.0	20.8
100	4.6	6.2	7.7	9.3	11.0	12.7	14.4	16.1	17.9	19.7
101	4.0	5.4	7.0	8.5	10.1	11.7	13.4	15.1	16.8	18.6
102	3.3	4.8	6.2	7.7	9.3	10.9	12.5	14.1	15.8	17.5
103	2.7	4.1	5.5	7.0	8.5	10.0	11.6	13.2	14.8	16.5
104	2.1	3.5	4.9	6.3	7.8	9.2	10.8	12.3	13.9	15.5
105	1.6	2.9	4.3	5.6	7.1	8.5	10.0	11.5	13.0	14.6
106		2.4	3.7	5.0	6.4	7.8	9.2	10.7	12.1	13.7
107		1.8	3.1	4.4	5.7	7.1	8.5	9.9	11.3	12.8
108		1.3	2.6	3.8	5.1	6.5	7.8	9.2	10.6	12.0
109			2.1	3.3	4.6	5.8	7.1	8.5	9.8	11.2
110			1.6	2.8	4.0	5.3	6.5	7.8	9.1	10.5

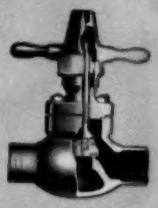
Dry Bulb Temp., °F	Wet-Bulb Temperature, °F									
	70	71	72	73	74	75	76	77	78	79
	Relative Humidity, Per-Cent									
70	100.0									
71	95.2	100.0								
72	90.7	95.3	100.0							
73	86.4	90.8	95.4	100.0						
74	82.3	86.6	91.0	95.4	100.0					
75	78.3	82.5	86.7	91.1	95.5	100.0				
76	74.6	78.6	82.7	86.9	91.2	95.5	100.0			
77	71.0	74.9	78.8	82.9	87.0	91.3	95.6	100.0		
78	67.6	71.3	75.2	79.1	83.1	87.2	91.4	95.7	100.0	
79	64.3	67.9	71.7	75.5	79.3	83.3	87.4	91.5	95.7	100.0
80	61.2	64.7	68.3	72.0	75.7	79.6	83.5	87.5	91.6	95.7
81	58.2	61.6	65.1	68.7	72.3	76.0	79.8	83.7	87.6	91.7
82	55.4	58.7	61.2	65.5	69.0	72.6	76.3	80.0	83.8	87.8
83	52.7	55.9	59.1	62.5	65.9	69.3	72.9	76.5	80.2	84.0
84	50.1	53.2	56.3	59.6	62.9	66.2	69.7	73.2	76.8	80.5
85	47.6	50.6	53.7	56.8	60.0	63.3	66.6	70.0	73.5	77.1
86	45.3	48.2	51.2	54.2	57.3	60.5	63.7	67.0	70.3	73.8



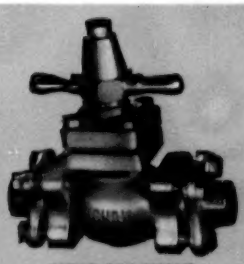
PACKLESS VALVE
With balanced-action



AMMONIA VALVE
Bolted Bonnet — screw or flanged connections. Also with screwed bonnet, sizes 1" and under



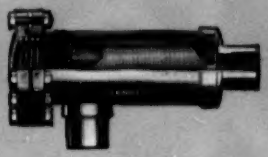
WING CAP VALVE
Non-ferrous



WING CAP VALVE
Semi-steel—with companion flanges and adapters

...pays no premium for.. the extra advantages found in Henry products

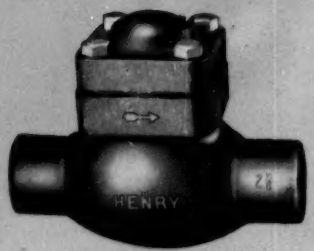
...for the extra satisfaction that follows their use



STRAINER
Angle type with patented distortion-proof flange

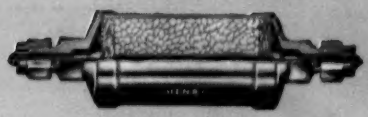
Y-STRAINER
Brass plated. Welded steel construction with forged brass connections. Size ⅜" O. D. S. through 4⅛" O. D. S.

BALANCED-ACTION PACKLESS LIQUID LEVEL GAUGES
Valves are backseating—diaphragms may be inspected or replaced without loss of liquid. Conforms with all safety code requirements.



CHECK VALVE
Piston Type For Freon. Sizes ⅜" through 4⅛" O.D S.

DRIER
Cartridge type 12 to 500 cu. in. capacity. Sizes ⅝" to 2⅛" O.D.S



DRIER
Large diameter and capacity—minimum pressure drop.

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No. 101 Packless and packed valves, strainers, driers, check valves, relief valves, three-way valves, liquid gauge sets, flange unions and accessories for air conditioning, refrigeration and industrial uses.

No. 201 Ammonia valves and accessories.

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Large capacity—fast positive relief and reseating action. Very small differential between opening and closing pressures.

STRAIGHT-THROUGH RELIEF VALVE
Large capacity—All Brass Construction. Sizes ⅛" M.P.T. through 1" F.P.T.

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JUD PLUMBING & HEATING COMPANY

"the second control more than pays for itself"

HERE you see the utmost in boiler water level control keeping excellent company. Those No. 150 Pump Controllers and Low Water Cut-offs are installed on two large modern Kewanee firebox boilers in the boiler room of a big new addition to San Antonio's already large and famous Santa Rosa Hospital.

The men and firms who turned out this commendable job are listed above. An interesting aspect of the engineering is the use of two McDonnell No. 150 Controls on each boiler; one positioned higher than the other; the upper control used solely to control the feed pump; the lower, solely as a low water cut-off to stop the gas burner.

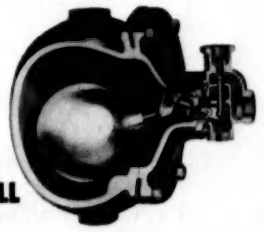
In a letter from the heating contractor, the reason for this arrangement was given: When the controls were installed, it was decided that local conditions would produce considerable fluctuatiors in the boiler water level which would often cause the low water cut-off switch to stop the burner when there was no actual condition to warrant cutting off. By setting the low water cut-off so that it will stop the burner only when there is a serious low water condition, unnecessary service calls are avoided. As a result, says the letter, "the second control more than pays for itself."

The resourcefulness to meet special conditions in a practical way is characteristic of men who know their heating and equipment. So it is not surprising to find McDonnell equipment in so many of these well engineered, capably-executed installations.

McDONNELL
No. 150 Control

Maximum Steam Pressure, 150 lbs.
Underwriters' Approved

Holds boiler water level within the close limits that assure maximum steaming efficiency and fuel economy. Ask for complete set of installation and wiring diagrams covering both single and battery boiler jobs.



McDONNELL
No. 27

Make-up Water Feeder

An excellent team-mate for the No. 150, this McDonnell make-up water feeder is mounted on the receiving tank to maintain a minimum water level at all times.

McDONNELL & MILLER, *Inc.*, 3500 N. Spaulding Ave., Chicago 18, Ill.

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